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INDEPENDENT OFFICES APPROPRIATIONS FOR 1963

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HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

EIGHTY-SEVENTH CONGRESS

SECOND SESSION

SUBCOMMITTEE ON INDEPENDENT OFFICES

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PART 3

CIVIL DEFENSE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
NATIONAL AERONAUTICS AND SPACE COUNCIL
OFFICE OF EMERGENCY PLANNING
TESTIMONY OF MEMBERS OF CONGRESS, INTERESTED ORGANIZATIONS, AND INDIVIDUALS

Printed for the use of the Committee on Appropriations

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INDEPENDENT OFFICES APPROPRIATIONS FOR 1963

TUESDAY, MARCH 13, 1962.

OFFICE OF CIVIL DEFENSE

WITNESSES

STEUART L. PITTMAN, ASSISTANT SECRETARY OF DEFENSE (CIVIL DEFENSE)
PAUL S. VISHER, DEPUTY ASSISTANT SECRETARY OF DEFENSE (CIVIL DEFENSE)
WALMER E. STROPE, DIRECTOR OF RESEARCH, OFFICE OF CIVIL DEFENSE
ROBERT E. HOLT, EXECUTIVE ASSISTANT TO THE ASSISTANT SECRETARY OF DEFENSE (CIVIL DEFENSE)
JOSEPH ROMM, DIRECTOR, PLANS AND PROGRAMS, OFFICE OF CIVIL DEFENSE
FREDERIC STEVENSON, DIRECTOR, PROGRAMS DIVISION, OFFICE OF CIVIL DEFENSE
TROY V. McKINNEY, COMPTROLLER, OFFICE OF CIVIL DEFENSE
EDWARD S. JOHNSON, DEPUTY COMPTROLLER, OFFICE OF CIVIL DEFENSE
JAMES J. BURNS, SPECIAL ASSISTANT TO COMPTROLLER, OFFICE OF CIVIL DEFENSE
WILLIAM P. DURKEE, DIRECTOR, FEDERAL ASSISTANCE, OFFICE OF CIVIL DEFENSE
JOHN W. McCONNELL, REGIONAL COORDINATOR, OFFICE OF CIVIL DEFENSE
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CHARLES MANNING, OFFICE OF THE GENERAL COUNSEL, DEPARTMENT OF DEFENSE
NEAL FitzSIMONS, DIRECTOR, PROTECTIVE STRUCTURES DIVISION, OFFICE OF CIVIL DEFENSE

Mr. THOMAS. Gentlemen, let the committee please come to order.

We have with us this morning the Assistant Secretary of Defense and the staff from the Office of Civil Defense. We have been furnished a list of witnesses and we are certainly delighted and honored to welcome aboard this distinguished group.

Mr. Pittman, tell us something about yourself and all your group here. I do not know whether you gentlemen have been confirmed or not. We always confirm our agency members right in here.

Tell us something about yourself and your staff. We are interested in all of you. This is one of our old pet agencies, you know. We have a deep affection for all of you.

BACKGROUND OF SECRETARY PITTMAN

Mr. PITTMAN. I was sworn in last September as Assistant Secretary of Defense for Civil Defense. It is a two-headed job. I am the Secretary of Defense's principal adviser and assistant on civil defense and I am head of an agency that has been created in the Department of Defense, a different agency from the one you mention—a part of the Defense Department, and an integral part of it, called the Office of Civil Defense.

I am a lawyer by profession. I graduated from Yale Law School. During the war I was in the Marine Corps. I spent most of my time on the coast of China working with civilians.

My experience has been largely as a practicing lawyer except for a few years in the early 1950's in which I was participating in the foreign-aid activities of the Federal Government as a lawyer. I have been practicing law since then here in Washington with the firm of Shaw, Pittman, Potts, Trowbridge & Madden.

I bring no prior experience in the subject of civil defense to this task. Perhaps the only experience that is worth commenting on is that during the war I came away with some very sharp impressions of what civilians can do, what adjustments they can make, when thrown into a situation in which they never expected to be. I refer to the refugees from Shanghai who, most of their lives, lived very high—better than most of us. They spent several years of the war in the hills of China south of Shanghai and were exposed to an existence which was very marginal. Anything they had was taken away from them almost on a weekly basis by troops, sometimes their own Nationalist troops, sometimes the Communists and sometimes the Japanese. I think of the attitude of these people as I read in the papers about the reactions of many Americans who are trying to predict what Americans would do in the event this country was ever attacked. The assumption that we cannot adjust to extremely difficult circumstances is something I think we know very little about in this country. I attach value to the opportunity to observe another people who were thrown into these extremities.

I think that is the only background on myself that is pertinent.

Mr. THOMAS. How old are you, may I ask?

Mr. PITTMAN. I am 42 years old. I am a resident of Maryland. I was raised in New York and born in Albany.

Mr. THOMAS. You have certainly had a vast experience in the course of a few short years. Congratulations.

That is quite a record and we are delighted to have you.

Do you want to introduce some of your staff members?

INTRODUCTION OF STAFF

Mr. PITTMAN. Mr. Paul Visher is my deputy sitting on my left. He is also a lawyer and by coincidence a graduate of Yale Law School. He is 39 years old. Most of his experience has been in the manufacturing business in research activities. He has more recently been

with the Hughes Aircraft Co. as the manager of their advanced program development. He practiced law earlier in San Francisco. He has been a resident of California now for most of the postwar years. He spent his war years in the Navy. He brings a combination of practical legal experience and a broad range of technical experience to us which proved to be a moving force in the early days of the civil defense efforts in the Defense Department. He was here before I was and started a lot of things in motion.

Mr. Romm is sitting on my right. He is an old hand in the Department of Defense. He has been a civilian in the Office of the Secretary of Defense for some years and has been concerned with a variety of matters but particularly with organizing and making use of the facilities that exist in various places in the Defense Department and outside of the Defense Department to analyze and evaluate resource programs and damage assessment methods, using largely computer facilities. He is very important to our current efforts to develop our capability for program evaluation and damage assessment. He is our Director of Programs and Plans and is part of the top management in the development of our program.

Mr. McKinney is our Comptroller. He has been with the Defense Department for many years. He was formerly with the Bureau of the Budget. We have followed the pattern in the Defense Department and the leadership of Mr. Charles Hitch to use the comptroller function as a somewhat larger responsibility than is perhaps typical in the Government. He and his office are responsible for making sure that every commitment of funds, and every action that might lead to a commitment of funds, is coordinated, and the prescribed process of decision has been carried out in the proper way. He is also concerned with the programing of these funds and works very closely with Mr. Romm.

Mr. Holt is my Executive Assistant. He has also been in the Defense Department for some years and was formerly the Executive Assistant to Perkins McGuire, Assistant Secretary of Defense for Installations and Logistics. He is my connecting link with the rest of the Defense Department, as well as my executive officer, and has had a great deal to do with the creation of this organization.

Mr. Durkee is a graduate of the Yale Law School at about the time I was there. That makes three of us.

Bill Durkee is responsible, I think, for the most difficult part of our operations, which is the attempt to bring about a coherent nationwide civil defense program, working through people you do not control. I refer to our relations with State, local and private organizations.

Mr. THOMAS. That ought to be the easiest part of it.

Mr. PITTMAN. I think it is easiest to develop a program when you have a grip on the components and I cannot say that we have that in civil defense organization. You know the difficulty; if you are not willing to give the money away and you want to accomplish a program, and you have to work through other organizations, it takes a great deal of skill and tact. Mr. Durkee brings experience in this type of activity which is not from civil defense or the local political area, it is more in the international field.

Mr. OSTERTAG. Mr. Secretary, did you mean to imply that you people should have greater control over the assistance program and the organization throughout the country?

Mr. PITTMAN. I would not call it control, but I mean to imply we need to have a greater influence, I might even say "leverage" in the administration of our program to bring about a coherent civil defense effort at the State, local and Federal level. There is no question as to that need.

Mr. Durkee has been in the State Department and has been active before he came into the State Department, in New York, as the director of the American Committee on a United Europe under the direction of General Donovan.

Mr. Strope is our Director of Research. He is probably the only new man in our organization who has spent a solid 10 years in thinking deeply about the long-range problems of civil defense. More recently he has been associate director of the Naval Radiological Defense Laboratories on the west coast, located in San Francisco.

Mr. THOMAS. That is Hunters Point?

Mr. PITTMAN. Yes, sir.

Mr. OSTERTAG. Mr. Secretary, approximately how many of the key people in your organization were transferred from OCDM?

Mr. PITTMAN. I would say of the key people, who form the top management, the majority were brought in from the outside or are from the Defense Department. But the vast majority of the total number are transferred from OCDM.

Mr. OSTERTAG. But not particularly the key members of your organization?

Mr. PITTMAN. I think it is fair to say there is a new top management on top of a structure which is basically the same organization, not organized the same way but the same personalities.

Mr. THOMAS. Go ahead, Doctor, and proceed with your general statement.

You have a very fine capable staff and if there is anything you have to say on behalf of the staff you do not need to be too modest about it. We will be delighted to have it in the record.

Mr. PITTMAN. I have identified the top people and I think you can make your own judgment as to what they look like because you will probably be hearing from most of them.

Mr. THOMAS. If you have a statement we will be delighted to hear you.

GENERAL STATEMENT

Mr. PITTMAN. Mr. Chairman and members of the committee, I appreciate this opportunity to make my first appearance before this committee to present the President's civil defense program and explain its budgetary requirements.

I am aware that this committee has devoted many years to the study of Federal civil defense budgets and operations. A change has taken place in the priority accorded civil defense by the executive branch, in the program objectives and in methods of operating. With your permission I will take the time to explain why the Secretary of Defense is requesting a greatly expanded civil defense program, what such a program is designed to accomplish and something of our present and proposed methods of reaching the program objectives.

Since transfer of the civil defense program to the Department of Defense last summer, the central task has been to define a realistic objective and sharply focus all activities on its attainment. The objective is double barrelled: to locate and to stimulate the creation of enough fallout shelter space substantially to meet the full national requirement; and simultaneously to bring about organization, planning, and training in every community in the country so that people will know how to go to shelter space, how to live in it, how to emerge, decontaminate, and survive in the hazardous first few weeks.

This focus is not reflected, however, in our research program, and I put considerable reliance on the scope and imaginative conception of this program to protect us against the pitfalls of narrowing the program objectives in the manner I have described. During the next year, the research program will generate a great deal of investigation into postattack problems; into fire conditions after nuclear attack; into the problems of lowering the cost of shelter construction designed to give protection against blast and heat; into bacteriological and chemical warfare defenses; into lesser known aspects of the effects of radiation and fallout.

NEED FOR SHELTER SYSTEM

Shielding from radiation is the first and essential task of civilian protection under nuclear attack. Without a system of shelters, civil defense cannot be taken entirely seriously by the growing number of people who understand what a nuclear explosion can do. The President's civil defense program, therefore, is designed to offer the most realistic and effective protection which can be made widely available to the American people, consistent with the demands of other high priority national needs.

It is important to be clear about what this program is not. It is not a massive undertaking to bring maximum security in a nuclear war to the American people by providing them with habitable space underground. Estimates from various studies of such an undertaking have gone from $20 to $150 billion. That last figure came from the Rand studies. The $20 billion figure came from the Holifield Report.

Nor is it a continuation of the easy, but unrealistic, programs of the past, which have assumed that part of the people would have opportunities to protect their families by building home shelters and that the rest would be taken care of by evacuation to unsheltered areas.

This is an ambitious undertaking, loaded down with the kind of problems most of us would like to avoid. It is forced on us by certain simple facts: first, nuclear war is possible; and second, in addition to its unavoidable destruction, it would bring hazards to life which can be minimized by preparations within reach.

Each informed American is concerned with improving the odds of survival for himself, his family and his neighbors against the chance that a nuclear catatrophe might occur. But more important to each of us is taking part in a nationwide effort to make certain that our country will not go completely under in any kind of enemy attack which might be anticipated in the foreseeable future. There would be a very real satisfaction in knowing that we have collectively done

enough to shield the American population from destruction, so that we can be certain of enough survival to recover from such an attack.

Mr. THOMAS. There is where you hang your hat and anybody will buy that, but just exactly how are you going to accomplish it? How are you going to do it? What certainties do you have that you are going to do it? What about your engineering? We are not talking about studies. We have been studying for 10 or 12 years. We have been researching this and we have been planning here and planning there. What can you put your finger on that you can do to accomplish that purpose? Can you put your finger on it? If so, there will not be too much argument. If not, you may have plenty. So, let us get down to cases. You are familiar with the program and so are we, so we do not have to cross too many bridges here now.

Mr. PITTMAN. What I have to say in this statement will answer these questions.

Mr. THOMAS. Proceed.

Mr. PITTMAN. The attacker will have committed national suicide; this we are sure of today. Over the next few years we must do what is necessary to be sure that the life of our Nation and our institutions can be reconstructed by the survivors of an energetic and vigorous people. Any significant increase in the number of survivors that can result from reasonable precautions is vitally important to this objective.

This Administration has come to a very deliberate and carefully considered conclusion that a nationwide system of fallout shelter space can save enough lives in a nuclear war to more than justify the tangible and intangible costs.

Actually, the words I am reading now were used by Mr. Gilpatric in a speech he made yesterday to the U.S. Civil Defense Council. It was a deliberate and short speech. We felt it was necessary.

Mr. THOMAS. And well timed. There have been three or four of them in the last 4 days.

Mr. PITTMAN. I do not know what the implication of your remark is, Mr. Chairman.

Mr. THOMAS. It is obvious.

Mr. PITTMAN. The need for this speech is long overdue and the reason for it, I will be quite frank with you, is that a sense of hesitancy has communicated itself to the public on this subject.

Mr. THOMAS. We like Mr. Gilpatric. You tell him his statement was all right and it was beautifully timed. It was just coincidental, we know, and it was long overdue but still it was coincidental and we understand it. Tell him we are on his side—up to a point.

Mr. PITTMAN. We hope we can stretch that point.

The point I wanted to make about these remarks is that they were carefully considered and also that they had the approval of the President. It was believed to be necessary to reveal more information about why the Administration felt the system of fallout shelters was important. The whole concept has been under attack by certain "experts" outside of Government who consider that this approach is questionable or that the returns on it would be marginal. This, of course, is the fundamental question, as you pointed out, that we want to get to. But I wanted to explain to you these words have been given a great deal of attention.

EXTENT OF PROTECTION OFFERED BY FALLOUT SHELTERS

To go on: The Administration has arrived at this conclusion after extensive study. The conclusion is that a nationwide system of fallout shelters can save enough lives in a nuclear war to more than justify the tangible and intangible costs.

The fact that complete security is impossible and that the fatalities would be extraordinarily high, no matter what we do to prepare ourselves, must not be allowed to discourage efforts to assure our national survival.

Those who say that fallout shelters meeting the minimum Federal criteria will not make a significant difference under heavy attacks are wrong. The importance of fallout shelter space can only be measured by making assumptions about how an attack might begin, about an enemy's objectives in an attack, about the degree of reliability of weapons systems, about the capability of our forces to blunt the attack and about many other variables.

But a remarkable result from studies of attacks, simulated under the many varying conditions, is the demonstration of consistent and clear value of fallout shelter space.

In general, under a wide variety of attacks most damaging to population, which might be possible in years to come, it appears from present conservative estimates that 40 to 55 million persons, who would otherwise be killed, could be expected to survive as a result of a system of fallout shelters, sufficient to meet the national requirements and backed up by widespread local organization and knowledge of how to use the shelters, which is just as important as shelters.

In an attack directed at military targets, the fallout hazard would remain high.

Mr. THOMAS. How do you arrive at those figures? What degree of accuracy and authenticity do we have to back them up? That is where the trouble is.

Mr. PITTMAN. That is why we give it in parameters. The only thing we can say with certainty is that there are outer limits to these figures and within those limits we come to certain conclusions.

BALANCE OF POWER IN WEAPONS

Mr. THOMAS. Is there any certainty that anybody will ever be foolish enough to drop a bomb? Of course, I do not like to gamble.

Mr. PITTMAN. I think it is unlikely that this will happen.

Mr. THOMAS. Are we not on the same level with Mr. Khrushchev just like we were with Mr. Hitler in World War II? Mr. Hitler had all the poison gas in the world and all the bacteria and there is some question in my mind to say the least, that if you give bacteria 6 months to work it will do more harm than a dozen or two well-placed bombs. Mr. Hitler had the gases and had the bacteria and he had the means of transporting it to us and to any of the enemies he had in World War II. However, he did not use it. Some of that was used in World War I but it wasn't used in World War II. Why didn't he use it? Because we had as much poison gas, as much deadly bacteria, and the method of transporting it to his country.

Mr. PITTMAN. Neither side could have won with those weapons.

Mr. THOMAS. Neither side could have won, so neither side attempted to use them.

Are we not on that same level right now with Mr. Khrushchev? We must assume that he has the bombs and means of delivering them to this country, and certainly we know that we can deliver as many if not more to his country. It is certainly death and destruction beyond the thinking perhaps of anybody in this room, as to what could happen. So, who is going to be foolish enough to drop the first one? Who is going to win? Can either side win by it? What is the purpose?

NATIONAL INTEREST

Now, following that thought, is it in the national interest? It is my guess there has been $8 to $10 billion spent on this program and there will possibly be $20 billion spent in the next 5 to 7 years. Those are the problems you gentlemen are going to have to help us with. That is what is sticking in our minds.

Mr. PITTMAN. This is sticking in the minds of many of us. I think the main comment I have to make is that the complexity of this subject makes it extremely difficult to get at all sides of it, and to come to a judgment, without the most detailed kind of a study and input from many directions. Scientific judgments, intelligence information, our own know-how in the use of nuclear weapons, all of these sources of knowledge come to play and a judgment has to be made. This has happened. A judgment has been made. The Administration is convinced that the threat is sufficiently real, and the opportunity to meet it is sufficiently real, that we should at least take this much of a step to protect the population.

Mr. THOMAS. Now, the only positive factor that we have, following your line of thinking, the question I pose is simply this: The world has certainly been in an uproar for the last 5 or 6 years, brought on by the Russians in the last days of Mr. Stalin and his predecessors and now Mr. Khrushchev. It must be assumed that in that period of time the Russians and the United States have had the means to deliver and the bomb to do the exploding, to create the damage. And yet during this very troublesome time, neither side has seen fit to do anything except negotiate and do some talking and so forth and so on.

So there is the only positive factor we have to go on, is the last 5 years. What the next 12 months may bring or the next 36 months or the next 5 years is the unknown quantity, isn't it?

Mr. PITTMAN. Indeed, it is.

Mr. THOMAS. Isn't that a pretty good analysis of the situation?

Mr. PITTMAN. Yes, it is an excellent analysis. I think it may underplay the significance of the two great sources of power having put so much of their defensive and offensive strength into nuclear weapons systems that they would not have the options perhaps of World War II and dare to ignore the main source of their strength if they were ever forced to engage their forces directly.

Mr. THOMAS. We will put our resources in those weapons which we have felt for 8 or 10 years is a deterrent.

OPINIONS AS TO EXTENT OF PROTECTION AVAILABLE

Mr. OSTERTAG. Mr. Chairman, I call attention to the fact that some of the outstanding scientists in the United States when asked about the fallout shelter program pointed out what a feeble measure it is against the potential problem.

Mr. PITTMAN. Well, we think differently, and one of the purposes of this hearing is to give you the basis of our thinking. We think that the country is just beginning to have an opportunity to learn and to have a little closer information on the effects of nuclear attack. Those scientists who have had the opportunity to go deeply into this and look across the broad spectrum, not just their own field, have in many cases, and I believe in most cases, had the experience of discovering it is not quite as hopeless as many have been saying. There are definitely things you can do about it that will make a lot of difference.

Where we are dealing in areas of the unknown I think many scientists, emotionally motivated on this subject, have been inclined to assume that what we do not know is catastrophic. This is not a scientific, objective approach to a very difficult problem. I will read on.

COUNTERFORCE ATTACKS

But since many of these targets are located away from congested areas, fatalities from blast and heat would be relatively low. In such circumstances, the lifesaving potential of fallout shelters could greatly exceed the 40 to 55 million lives saved, which I have mentioned as estimates for other patterns of attack, and total fatalities would be very much lower.

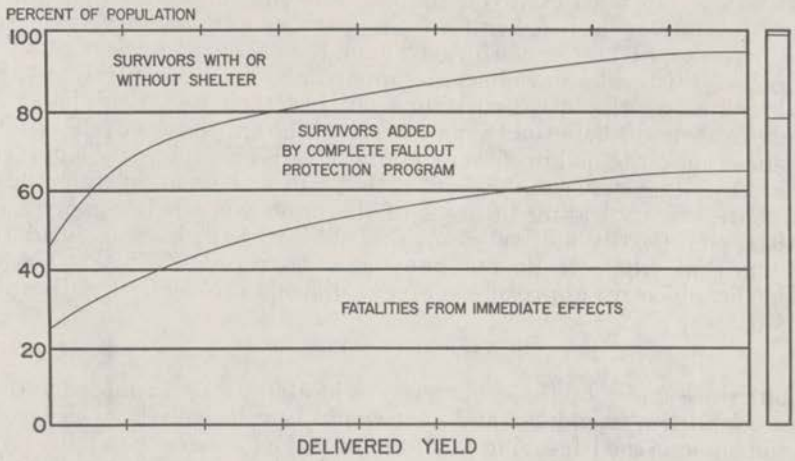
I am talking about a situation which is not an unreasonable one, where nuclear war is directed toward disarming the other side. In this situation, the efficacy of a fallout shelter system would be tremendous.

Differing conditions of an attack and increasing capability over the years ahead, may sharply increase the fatalities which cannot be avoided by fallout shelters and sharply reduce the numbers of people who might survive unsheltered. But the lives saved by fallout shelters is the most stable element in these projections. And, as the weight of the assumed attack rises beyond current reasonable estimates, the role of fallout shelters in saving those not killed by blast and fire becomes even more vital—most of the survival would then be because of these shelters.

I would like to produce these charts. I think the charts will make clear what I am saying here. We have three increments of the post-attack population that we are looking at. One is people saved by fallout shelters. Another is people who would have survived anyway and the third is people who would be killed anyway, because they were too close to the point of detonation.

(The chart referred to follows:)

PERCENT FATALITIES
MIXED COUNTERFORCE-POPULATION ATTACK



Mr. PITTMAN. "Counterforce" means going after our retaliatory striking power, our SAC bases and missile bases and submarine bases.

The "population attack" means going after congested areas. This chart assumes they are trying to do both within the limits of their capability.

Mr. OSTERTAG. Mr. Secretary, is this based upon the completion of your program?

Mr. PITTMAN. It assumes we achieve our objective of meeting the national requirement for fallout shelters, but only the fallout shelters. It is the cheap protection, as against the more expensive protection against blast-heat.

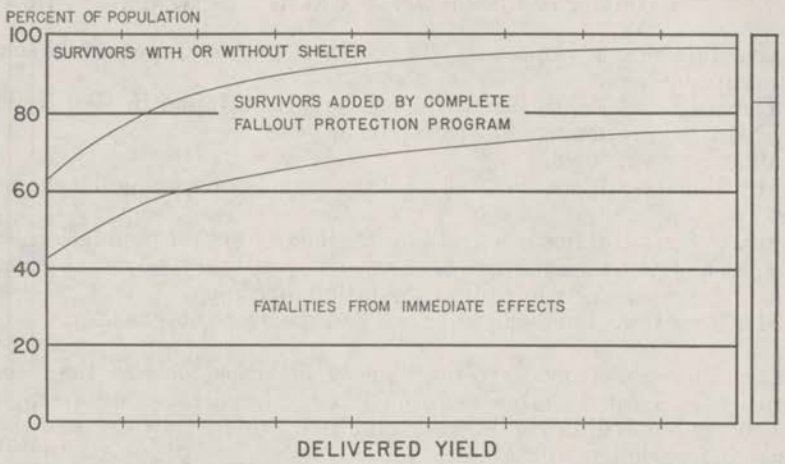
You can see that the survivors, with or without shelters, drop way off. It becomes almost negligible as the intensity of the attack rises.

The column that is broken at the right is a way-out figure on the number of megatons delivered which is unrealistic in our view. We have included it to carry the argument to the extreme.

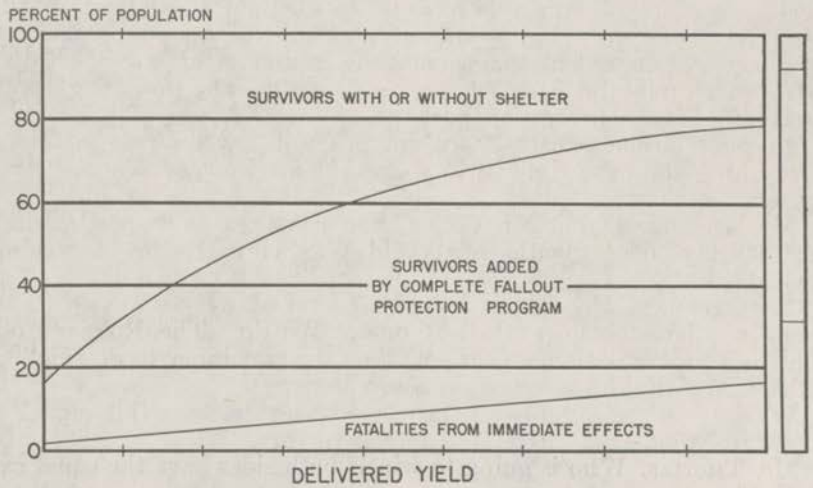
The point of this chart is to show that the efficiency of fallout shelters is not impared by the rising level of attack, or, as shown in other charts I will show, by variations in the type of attack. The assumption has been made by many of the shelter skeptics who have commented on this subject, that a point is reached where the capacity of the enemy to deliver a very large megatonnage will obviate the usefulness of anything as flimsy, in their view, as a fallout shelter. Well, this just isn't so.

There are two other charts, one assuming strikes on population centers and another concentrating on hitting our military counterforces.

PERCENT FATALITIES POPULATION ATTACK



PERCENT FATALITIES COUNTERFORCE ATTACK



Mr. PITTMAN. This chart assumes that they go after population only. This seems to me the least realistic contingency, because they expose themselves to tremendous damage. It is a costly sacrifice of military objectives to throw all their weight against population centers.

You can see that, nonetheless, the blue band of lives saved by fallout shelters remains quite constant.

CONSIDERATION OF WORLD WAR II EXPERIENCE

Mr. THOMAS. I wonder if the gentleman would permit a small interruption here.

The only experience the world has had is in Japan in World War II. How many bombs did we drop on Japan?

Mr. PITTMAN. Two.

Mr. THOMAS. Were they on military targets or on population centers?

Mr. PITTMAN. That is a real point. They were on population centers, although I understand there was some military target objective.

Mr. THOMAS. Were military targets destroyed or——

Mr. PITTMAN. This was after we had disarmed Japan, Mr. Chairman.

Mr. THOMAS. They were not exactly disarmed or else the President of the United States wouldn't have ordered the bomb dropped. When the bomb did drop in the population centers they came to their knees in a period of what time?

Mr. PITTMAN. A very short time.

Mr. THOMAS. There is some experience you ought to use in your calculation.

Mr. PITTMAN. The two Japanese atomic explosions have provided an input to understanding this whole problem. But, again, we are trying to protect against the possibility of a surprise attack of the Pearl Harbor type or an escalation of a limited war which gets out of control or miscalculation, a mistake in judgment on somebody's part, which puts the attacker in a position where he thinks he has to strike, for his own protection, perhaps.

In some circumstances, there may be military reasons to throw everything you have right away to get the most out of your weapons system.

Mr. THOMAS. Didn't Mr. Hitler have every reason on earth in the last 90 days or 4 months of World War II to throw everything he had?

Mr. PITTMAN. He did not have that kind of weapons system and could not have thrown it all at once. We do. The Russians do. This is a new situation. I do not think the capability to do this has existed on both sides as long as you have indicated.

We are just coming into an era where both sides have this capacity. That is what is new in the civil defense picture.

Mr. THOMAS. Who is going to win if both sides have the equal capacity?

Mr. PITTMAN. I think the winner will be the survivor.

Mr. THOMAS. Will there be any?

Mr. PITTMAN. I think there can be. This chart is one indication of that fact. It shows somewhere between 40 and 55 million people taking the worst case; taking the best cases, a very much larger number of people. Saving that number of people for a base for survival of this country has vast significance. I do not think the whole free world can be attacked and subjected to this kind of treatment.

INVOLVEMENT OF OTHER NATIONS IN EVENT OF ATTACK

An all-out attack would largely strike here and a few other places. I would suspect other nations would be active in helping us get back on our feet, we having prevented the world going Communist by destroying the attacker.

Mr. THOMAS. Do you mean to intimate by that suggestion that the thinking of our planners, either civilians or military, is if this country should be attacked with an atomic bomb, or any other type of bomb—hydrogen—we would not be the only one attacked but simultaneously there would be other of our allies attacked?

Mr. PITTMAN. I think the attacker would probably develop a target system, within the limit of his capability, which would attempt to destroy the center of his opposition and to disarm the bases that might attack him that might be scattered in various parts of the world.

Mr. THOMAS. What countries, for instance, besides the United States?

Mr. PITTMAN. The location of such bases extend from the Middle East, North Africa and across Europe up into England. It is primarily those areas.

Mr. THOMAS. Do you mean to say then if we were to be attacked by Russia, simultaneously Russia would attack six or eight more countries?

Mr. PITTMAN. I think the best guess is, in general, yes.

Mr. THOMAS. Among those will be Italy. We have bases in Italy and Spain.

Mr. PITTMAN. I think those bases might well be attacked in total war.

Mr. THOMAS. Germany, England, India, Pakistan, North Africa?

Mr. PITTMAN. Yes. Targets might exist in most of those areas.

Mr. THOMAS. Ireland?

Mr. PITTMAN. This could dilute the attack on us.

Mr. THOMAS. You are making a pretty good case the man will never do any attacking, are you not?

Mr. PITTMAN. The difference is between an attack which would try to break the back of the opposition, which is the United States, and one that would go after military targets, wherever they exist in the world. I think it a good guess that they would go after some of those military targets. In years ahead, they may still have a left-over capability they can apply to a population attack. I think that a population attack would much more likely be directed against this country than any other country. If they bring us to our knees, they do not have the problem of other countries.

Mr. THOMAS. When he drops his first bomb on the United States, he declares war on 10 or 12 other countries, all much closer to his boundaries than ours?

Mr. PITTMAN. I do not think he declares any wars. He just goes after the places that can hurt him which are targets.

Mr. THOMAS. Can you imagine a more effective declaration of war than dropping an atomic bomb?

Mr. PITTMAN. I think it would convey the message, yes.

MILITARY DISARMING ATTACK

Now, the last chart shows the situation, which I mentioned a minute ago as being a reasonable one, where the enemy is attempting to disarm us by knocking out our capability to hurt him. There are those who say, of course he will hit our cities first. There are those who say, of course he will not. There are many reasons why he will not. Nobody knows, and I am not undertaking to make any guesses as to what the enemy might do.

One of the real possibilities is this picture where he goes after the military targets with everything he has. On this assumption he cannot afford not to hit them with everything he has. In that case, the blue band on the chart, lives saved by shelters, is a very much more favorable picture. As the level of the attack rises, the number of people saved by fallout protection goes up to a much higher figure than the 40 to 55 million projected on the other charts. The green band showing survivors, with or without shelters, is very much larger. You have a picture here where the opportunity to recover from an attack is very much greater than in the other two attack patterns.

I would say this situation is alone a sufficient justification for a national fallout shelter system. The enemy, in my opinion, would not adapt his weapon system to offset the development of fallout shelters in this country.

I cannot conceive of a nation making the sacrifice of building onto its system of nuclear weapons a highly expensive increment for the sole purpose of killing people which adds nothing to its military objectives. I think it probable that long-term military planning will, as always in the past, be designed primarily to meet military objectives, not psychological objectives. It costs too much. I believe this chart shows a situation that is real enough to justify by itself the fallout shelter system.

OBJECTIVE OF MILITARY ATTACK

Mr. THOMAS. What is the ultimate military objective in any attack by one country on another?

Mr. PITTMAN. I do not think it is necessary to kill everybody. I think it is to conquer.

Mr. THOMAS. How are you going to conquer them any quicker than by killing people?

Mr. PITTMAN. I think the way you conquer them is to destroy their military forces and then they are at your mercy.

WORLD WAR II ATOMIC ATTACK ON JAPAN

Mr. THOMAS. That is one way. But when you have a weapon as destructive as this, again I go back to World War II when we dropped two bombs on Japan. Where did we drop them?

Mr. PITTMAN. That was a war we had already won. We were trying to shorten the cleanup and save the lives of our own troops by a psychological knockout blow. I think that was a unique situation that would not arise at the beginning of a war.

Mr. THOMAS. We wanted to get that war over. Our troops were still fighting. If this war should come, we would want to get it over with, and perhaps the quickest way to get it over with is as you pointed out. Your line of reasoning may not be too accurate.

ESTIMATED SURVIVORS OF ALL-OUT ATTACK

Mr. EVINS. Mr. Director, in the event of a war, your concern is with the survival of American civilians. Is this third chart the most promising graph you can conceive or generate? Is that the most optimistic picture you can present?

Mr. PITTMAN. I would say all three of these charts are based on very conservative figures produced by people who were instructed to take account of all the unfortunate considerations that present themselves. As between various types of attack, this is the optimistic one—the three types of attacks we have categorized.

Mr. EVINS. If Congress were to authorize, and the country were to really be sold on a national fallout shelter program which you propose, how many American civilians would you estimate might be saved in an all-out nuclear attack? If we buy what you propose, everything, how many people could your program save?

Mr. PITTMAN. You have this range from 40 to 55 million, which is based on the less optimistic assumptions. That range would be widened to include this more optimistic assumption. If we assumed a year of attack, then we would use the national intelligence estimates on the level of the attack, the capability of the Soviets in that year. We could then make an assumption as to their attack objectives and give you a figure. We can either do it in ranges, or give you a specific figure by setting specific assumptions. We would be glad to do so if you think it would be helpful.

I want to be clear these assumptions we make are assumptions and not predictions.

Mr. EVINS. I know you cannot predict them. Your only concern is survival, but based on your studies, if the Congress and the country bought your ultimate objective, your extreme program that you are advocating, the full program you are advocating, you should be able to give us an estimate after all the years of study as to how many Americans would survive.

Mr. PITTMAN. We can do so. We can only do so by making assumptions that we will have to state; otherwise we will be misunderstood. Some of these assumptions are in the area of classified information and we can give them to the committee, but we cannot give them to the public. That is one of our problems.

One of the main purposes of the Gilpatric statement yesterday was to give the best we could of unclassified information to the public.

Mr. THOMAS. Proceed with your statement.

ATTACKS ON POPULATION CENTERS

Mr. PITTMAN. It is worth noting that if an enemy were to concentrate his entire attack on population centers at the necessary sacrifice of military objectives, he could only reach a minority of the American people with the direct effects of the explosions. It would take an extraordinarily high level of attack to reach all cities with population exceeding 100,000. These cities, including urban fringes of larger cities, account for 33 percent of the national population; 37 percent of the American people live in small cities and towns of under 100,000; 30 percent live in the rural areas.

I cite these figures because I think there is frequently an assumption that the population of this country is largely in the big cities. It is not true.

Assuming an enemy had the sole objective of killing people, his best opportunity would be nuclear ground bursts which would blanket most of the United States with fallout. Unfortunately, if his attack objectives included more meaningful targets from a military standpoint, the same result could occur. A system of fallout shelters is an obvious requirement to meet either situation.

People in larger cities may, under certain attack assumptions, be exposed to much greater risks than the rest of the population. If it were practical to move urban populations far enough underground, something approaching security might be brought to the cities. Lacking the opportunity to provide any complete security, it should be understood that the President's program does a great deal to increase the chances of survival in small and large cities. In the first place, the chances of many cities being covered by blast, heat, and fire are less certain than is generally supposed by the many city dwellers who have it fixed in their minds that they will be under the bomb if war ever comes. If passed up by the direct effects of the explosion, the surviving population could be exposed to slow death and intense sickness caused by radiation from fallout. A program designed to take advantage of larger buildings for fallout protection is increasingly effective as the size of cities go up and the number of heavily constructed, high-rise buildings increases. In short, the larger cities can provide excellent fallout protection at relatively low cost for large numbers of people. Our program is designed to take advantage of this resource. Furthermore, large buildings offer a significant amount of protection against blast and heat. Data developed from Hiroshima is surprising in the extent of survival of people relatively close to the point of detonation—under heavy blast and a fire storm—who were protected by substantial buildings. This is not to say that our program would protect cities and other areas which turn out to be within the circle of destructive blast and heat; but the odds of survival even in cities and military target areas will be improved by fallout shelter space, marked, stocked, and understood.

SCOPE OF PRESIDENTS PROGRAM

The President's program has taken a form which assumes, and depends upon, active and meaningful participation by all levels of government, by all types of private organizations and by individuals

responsible for others in each community. The Federal Government is providing the structure on which such a nationwide effort can be built. A broadly based beginning for a system of community shelters will result from the current survey of existing buildings. The proposed shelter incentive program will spread community shelters more widely, particularly to locations accessible to people's homes. Technical assistance from the Federal Government will stimulate additional shelter construction.

COST OF SHELTER PROGRAM

We believe that this program could result in the creation of a system of shelters capable of protecting substantially all of the population against fallout radiation in about 5 years, provided the public understands the need and there is a full response from institutions and responsible citizens throughout the country. The cost to the Federal Government, including supporting activities necessary to make the shelter system effective, is estimated at roughly $3 billion over a 5-year period; the total cost for shelter space meeting only minimum Federal standards, in terms of the gross national product, can be roughly estimated at between $5 and $6 billion over 5 years. Estimates of actual total cost should be increased somewhat to allow for preferences of some individuals and institutions for greater protection or convenience than provided under minimum Federal design criteria. Some people will build in marginal blast-heat protection and it will be more expensive.

Mr. JONAS. You say $3 billion for protection for 175 million people. How much is that per capita?

Mr. PITTMAN. We have projected——

Mr. JONAS. I said, protect virtually all people.

Mr. PITTMAN. That is right. We are talking about the end of 5 years when the population will have increased.

Mr. JONAS. Say 200 million people. How much is that per person? One of you good mathematicians figure that up.

Mr. PITTMAN. The Federal cost is $60 per person saved, with the total cost to the country being $120. This is based on our estimates of saving the lives of approximately 50 million people with this program.

Mr. JONAS. If we keep having inflation, $100 will hardly buy a pair of shoes in 5 years, much less build a fallout shelter.

Mr. PITTMAN. $15 a person sheltered—not necessarily saved—is the Federal cost and $30 to $40 is the total cost.

Mr. JONAS. Per person?

Mr. PITTMAN. Yes. For the total cost.

Mr. OSTERTAG. I would like to clear up that point.

Three billion dollars, I thought was associated with your current program of estimating some 40 to 55 million survivors. Is this $3 billion for 5 years to protect the entire country and every person?

Mr. PITTMAN. That is correct. The $207 million amendatory appropriation last year financed the bulk of the cost of the survey and stocking, which we estimate will protect 50 million people. That moves us into the more expensive phase of creating new shelter space.

Mr. JONAS. Where does your 40 to 55 million people come in? Is that embraced in this year's program?

Mr. PITTMAN. It is not. That is at the end of the 5 years. The assumption made in these charts we have been looking at is that there will be access to fallout shelter space for the entire population.

Mr. JONAS. What will this program cost as it is envisioned today, the current program?

Mr. PITTMAN. The shelter portion?

Mr. JONAS. That is what we are talking about.

Mr. PITTMAN. Of the current program, the cost of the survey itself, setting aside stocking and equipping, is $81 million, estimated in the President's budget. We are asking for $450 million, excluding the administrative costs that go with it, for the incentive program designed to create new shelter space in schools and hospitals, and so on. This we figure will take us a long step forward, but it will not do the full job.

Mr. JONAS. How much will the program to protect 40 to 55 million cost?

Mr. PITTMAN. That is the $3 billion figure.

Mr. JONAS. That is not the entire population. That is the point I am trying to make.

Mr. PITTMAN. The $3 billion will provide a place for the entire population to go, daytime and nighttime population, which we estimate at 235 million shelter spaces.

We propose to create this within 5 years. We figure it will cost about $3 billion as the Federal part.

Mr. JONAS. I have done a little quick mathematics, and I figure $15 per person.

Mr. PITTMAN. That is what we come up with.

Mr. JONAS. That is what proportion of the Federal contribution?

Mr. PITTMAN. That is the total Federal cost.

Mr. JONAS. The overall cost?

Mr. PITTMAN. The total cost to the Nation, $6 billion.

Mr. JONAS. One and a half times the $15?

Mr. PITTMAN. $30.

Mr. OSTERTAG. On this question, the program today envisions protection up to 40 to 55 million people, does it not?

Mr. PITTMAN. It envisages protection of all the people. The 40 to 55 million figure that I have used is the lifesaving potential of the complete shelter system. It is not going to save everybody under the varying assumptions we have made. We think when we have this system of shelters, we have a hard core of dependable lifesaving of 40 to 55 million, and it could be much more under favorable assumptions.

Mr. JONAS. The $3 billion over 5 years is applied to a nationwide, complete fallout protection program?

Mr. PITTMAN. Right.

Mr. JONAS. Of which from 40 to 55 million could, or might be saved?

Mr. PITTMAN. Right.

DEVELOPMENT OF SHELTER SYSTEM

Mr. PITTMAN. To bring about a system of community fallout shelters, financed from various public and private sources, requires that a major element in our shelter program is the development of low-

cost methods of creating shelter space. Once the initial hurdle has been surmounted of creating a significant number of community shelters throughout the country, there will be grounds for some confidence that the rest of the job will be accomplished. There will then be an adequate base of public understanding; there will be more widely available technical knowledge for those who control and manage buildings and new construction; there will be community demands for a complete solution to the problem of shelters to which all levels of government and private institutional life will be responsive.

Mr. THOMAS. You are making a very optimistic assumption. You are expressing a hope.

Mr. PITTMAN. I think this is the most serious question.

ESTIMATES ON COST OF SHELTER SYSTEM

Mr. THOMAS. When we get into the matter, this is a part of the national defense setup. If it is as vital as most of us think it is, the time will come as we proceed and develop better plans, along with better plans will be an increased cost. Have no doubt about that. The cost will go up, it will not come down.

Mr. PITTMAN. I think I would agree with you.

Mr. THOMAS. And then the public will rightfully say, this is a part of national defense, that we do not individually pay for the upkeep of this division stationed in our locality, or the maintenance of these airplanes stationed in this locality, or the maintenance of this part of the fleet stationed in here, or the maintenance of the operation of some ICBM's stationed in this locality, the whole country pays for them, and we pay for our part regardless of where they are located by virtue of our tax payments. And since this program is part of the overall picture, why should we individually pay? Why should not it come out of our general tax load, our general national defense bill? So your figure of $3 billion, my guess is, it could be $10, $12 or $15, or maybe $20 billion.

Mr. PITTMAN. I estimated the total cost of $5 or $6 billion, setting aside the question of who pays for this limited bite we are taking here. If we get into the higher figures you mention, it would be because the Nation decided at some future date that much more complete security against blast and heat or other hazards is necessary.

Such further protection is a separable problem. If conditions change, it is one that could be addressed separately in a later year, and if it is not then justifiable, we will not do it.

Mr. THOMAS. My point is, there is no point playing down the cost of it.

Mr. EVINS. You are right.

Mr. THOMAS. Let's be realistic about it. We would rather estimate the cost to be more than it is. That is the safe thing to do, rather than underestimate it.

Mr. JONAS. I have an estimate here which I will go into later when my turn comes to ask some questions. It estimates the cost to be from $250 to $350 billion, and the cost per person to be not $15, or $40, but $2,000, based on a breakdown of cost for shelters to house 20 people.

Mr. PITTMAN. We think those kinds of figures are nonsense in

terms of the objectives that have to be met. This is putting the country underground.

FACILITIES PROVIDED FOR IN SHELTERS

Mr. JONAS. How long do you envisage keeping people in these shelters?

Mr. PITTMAN. Up to 2 weeks.

Mr. JONAS. Do you count water, lights, toilet facilities, everything?

Mr. PITTMAN. Stocking——

Mr. JONAS. Food?

Mr. PITTMAN. We plan to stock these shelters with a very austere solution to each of those problems.

Mr. JONAS. Sanitation?

Mr. PITTMAN. Sanitation included.

Mr. JONAS. Heat?

Mr. PITTMAN. This sanitation is not plumbing. We provide no electric lights; no heat, only——

Mr. JONAS. $40 per person?

Mr. PITTMAN. Body heat. They will be very close together.

Mr. EVINS. Off the record.

(Off the record.)

Mr. THOMAS. Proceed.

AVAILABILITY OF LOW-COST SHELTER SPACE

Mr. PITTMAN. We have reason to believe that a significant amount of shelter space will emerge from the shelter survey which is moving ahead of schedule, from the identification of opportunities to increase shelter space or bring it up to acceptable standards through minor modifications; through the application of design ingenuity to enable minor modifications in new construction to create low-cost shelter space.

I would urge the committee, if they are going to listen to some of the scientists, listen also to architects on the feasibility of low-cost shelters. They will present a different picture to you. There are many low-cost ways of building fallout shelter space. Some of this will be financed under the shelter incentive program, if authorized by Congress, and some of it will be created without Federal funds.

SHELTER SURVEY

The shelter survey, financed from fiscal year 1962 funds, is moving rapidly. We are taking inventory of all existing fallout shelter space for 50 or more people in existing structures. We have estimated location of space for 50 million people. Data on which to evaluate these estimates have just started to come in and will be accumulating over the next 2 months.

This operation has been, and continues to be, a management problem of major proportions. First, it was necessary to establish facilities to train large numbers of architects and engineers through intensive 2-week courses in the complex geometry and physics of interaction between radiation and building materials and building shapes. The technology for this job was in the hands of a few dozens of people in

the country when we started. We have now given training in two military schools and eight universities to approximately 2,000 professionals, of which about 1,800 have passed the course. These men have returned to their architectural and engineering firms to spread the technology to others.

Approximately 600 architects and engineering firms are under contract to do this job throughout the country. About 10,000 employees of these firms will be used to analyze the structures, gather up the data, assist in locating the names and addresses of owners of buildings, and in marking the acceptable shelter space.

Many other sources of specialized skills and techniques were brought to this task. The Bureau of the Census has refined data-gathering methods over the years which have been applied to the survey. The census tracts were used as units to parcel out the survey work. The so-called Fosdic forms developed by the Bureau of the Census have been adapted to simplify and automate the handling of the intricate and detailed information gathered on each structure. The basic information on these photosensitized forms is converted by the Bureau of the Census onto electronic computer tapes which then go to the Bureau of Standards for the machine computation and analysis. It is estimated that a professional engineer would take 2 to 5 hours to make the computations that are accomplished in less than 1 second for each building. Original sources of the data are the Sanborn maps developed by insurance companies, building codes, tax records and zoning records, supplemented by on-the-spot investigation where necessary.

OBJECTIVE OF SHELTER SURVEY

The result of the operation I have just described is to identify space believed to have a protection factor of 20 or better, which means radiation outside the shelter area is 20 times the radiation inside. The architects and engineers, equipped with the computations on potential shelter space and the permission of the building owners, then make a thorough examination of the premises, marking such space as appears to meet our standards and developing cost estimates of minor improvements to increase capacity and bring substandard space up to the 100 protection factor which we have prescribed.

We do not consider the 20 enough. We go to a 100 protection factor.

The resulting plans and estimates are made available to the building owner who may or may not undertake the modification work.

STATE AND LOCAL PARTICIPATION

The local government and civil defense organization is responsible to obtain from the building owners, or their agents, the necessary permission to use the identified space for public shelter purposes. We have eliminated most of the practical difficulties which might have deterred private building owners from participating.

We have nearly completed a test operation in 14 cities from which we expect to learn what we need to know about the unpredictable practical problems in the operations I have described. We particularly need experience on which to work out precisely how to divide responsibility between the Federal Government and State and local

governments. We have drawn the line by establishing a procedure which is now being tested. Early returns are encouraging. State and local governments and civil defense organizations are rising to the challenge of a difficult task, and one byproduct will surely be a rapid strengthening of civil defense organization as necessary to meet this complex and very concrete logistical undertaking.

COST OF OPERATION TO DATE

The cost of the survey operation is estimated at $81.8 million for fiscal year 1962 in the President's budget. This includes the operating and administrative costs of the Army Corps of Engineers, the Navy Bureau of Yards and Docks, the Bureau of Standards, and the Bureau of the Census. The costs of the architectural and engineering services—about 600 architectural and engineering firms—are the largest single element in the cost of the survey. These contracts are negotiated and administered by the Corps of Engineers and the Bureau of Yards and Docks. The cost of stocking, composed of radiation detection equipment, water containers, food rations, medical kits and sanitation kits, was estimated at $58.2 million for fiscal year 1962 in the President's budget.

CONTINUATION OF SURVEY

The survey will be continued to pick up new construction in years ahead, if the necessary funds are appropriated. Many types of buildings create opportunities to build in shelter space at relatively low cost, in many instances at no cost or at a cost only in convenience or preference by building owners (for example, the location of windows and doors or rearrangement of structural design). Space for 50 or more people will be picked up in the continuation of the present survey activities and, with the building owner's permission, would be marked and stocked.

The cost of continuing the survey in fiscal 1963 and subsequent years will be very much less than the current level of expenditures because it will be geared to the rate of suitable new construction. We have estimated that new construction of space suitable for the survey would bring in space for about 4 million people a year. Applying the $4 a space developed for our fiscal 1962 estimates there will be a requirement for $16 million for continuation of the survey, marking and stocking for fiscal year 1963. Although there is reason to anticipate that the cost of stocking may exceed the estimated $2 a space, this should be offset by a reduction in the estimated $2 a space for costs of conducting the survey.

STOCKING OF SHELTERS

One of the many byproducts of the shelter survey is the early development of a systematic and uniform method of stocking shelters with the minimum supplies necessary to maintain the health and strength of a group of people in a community shelter. A good deal of research and testing went into the establishment of the requirements for food, water containers, medical kits, radiation meters.

Stocking as part of the survey operation will indirectly facilitate stocking of private group shelters or shelters for less than 50 people. Federal procurement of these supplies is being handled in a manner which will encourage manufacturers to make the same items available to the public at low cost. The Federal experience in this test operation will be made available to industry and other institutions who will have occasion to stock large shelters.

Mr. THOMAS. We shall insert the remainder of your statement, and you may summarize.

(The statement follows:)

SHELTER INCENTIVES

The new element in the President's civil defense program is the proposed grants to be made available to nonprofit institutions engaged in health, education, and welfare activities. A $450 million fund has been requested for the next fiscal year to finance contributions toward fallout shelter construction by the eligible classes of institutions.

This would be the first time that the Federal Government has participated in construction costs for shelter purposes, except under prototype or experimental programs. In deciding upon this course, the conclusion was reached that a nationwide system of shelters could not be developed without some Federal participation in the direct costs of shelter construction.

We believe that the combination of a significant amount of shelter space brought into operation under the survey, together with the stimulation of well-located community shelters in schools, hospitals, and similar institutions around the country, would make the problems of civil defense real and lay a base for coherent planning and development of integrated civil defense systems in communities throughout the United States. We have requested sufficient funds for fiscal year 1963 to provide incentive payments for community shelter space adequate to protect 20 million people. We are not predicting that these 20 million spaces will be in operation during the next fiscal year, but we anticipate the need to obligate funds in that amount.

We have projected a requirement of an average of slightly less than one-half a billion dollars a year for 5 years to support the shelter incentive program, on the assumption that both subsidized and unsubsidized shelter space will by then have substantially covered the national shelter requirements.

QUALIFICATION FOR INCENTIVE PAYMENTS

In order to qualify for incentive payments, each shelter would have to accommodate a minimum of 50 people and would have to be open for public use in time of emergency, under local civil defense direction. Upon completion, each shelter would be identified by the continuing operations of the National Shelter Survey, and would be marked and stocked with food, water, first-aid kits, and radiation meters.

All schools, hospitals, clinics, and welfare institutions would be eligible for shelter incentive payments, provided they were operated by a State or local government unit, or by a private nonprofit organization. The nonprofit character of private institutions would be determined by the Internal Revenue Service criteria.

It is our present intention to establish a uniform rate of incentive payment computed at $25 per person sheltered, or cost, whichever is less. Except in unusual circumstances, 10 square feet will be allowed per person. The incentive is designed to encourage ingenuity in lowering costs of shelter space and also to encourage the adaptation of space for other purposes such as classrooms, cafeterias, gymnasiums, and storage rooms to serve the secondary purpose of providing protection against fallout radiation.

The eligible institutions are by and large organizations that have relatively limited access to sources of financing. They are engaged in activities of a public service nature which in many instances are of a type supported by Federal programs. These institutions are well located in relation to homes, whereas much of the surveyed space is likely to be more accessible to people at work. Their buildings are occupied by schoolchildren, invalids, and others for whom society must take a special responsibility. The school building is often the most

substantial community facility. After housing, school building represents the largest share of construction of the United States today. Schools are organized institutions with responsible leaders and orderly procedures. Hospitals provide emergency supplies and a trained cadre, organized for emergency operations. Thus, there is a logic to discrimination in favor of these institutions.

Some of the eligible institutions will have opportunities to create shelter space within the limits of the Federal grant. Others will have to find additional sources to finance the costs exceeding $25 a person sheltered.

TECHNICAL ASSISTANCE

I want briefly to call attention to another element of our program to bring about a nationwide system of fallout shelters. It is hard to describe because it is intangible in nature. But in many instances, it will be more productive of shelter space than Federal funds. I refer to a combination of technical assistance, training, and educational activities which are designed to disseminate the new technology of antiradiation construction to places where it counts. The courses for architects and engineers which I have described as a necessary first step in the shelter survey are being continued to meet a rising demand from architects and engineers not necessarily taking part in the survey. So this training is reaching out to architectural and engineering firms throughout the country, to engineers employed in industry, to architects and engineers on the payrolls of State and local governments.

Since September, nearly 3,000 plans for buildings have been evaluated for shelter capacity and the comments and suggestions of our engineers have been made available. A series of professional guide manuals are in preparation and two have been issued. Some will cover blast- and fire-resistant designs. Others will focus on schools, hospitals, garages, apartments, and other specialized problems of antiradiation construction. A special effort is being, and will be, directed toward providing design and cost data to industry.

SHELTER SPACE PROVIDED BY INDUSTRY

We anticipate that industry will account for a significant amount of new fallout shelter space. Some of it will be in office buildings and other high-rise structures which require little modification. Government-owned plants will be used to develop prototype plans for typical construction.

There is evidence already available that American industry will take steps to protect their employees and cooperate with local government in providing shelter for the general public. For example:

(1) The First Federal Savings & Loan Association of Richmond, Ind., built a shelter in the basement of their new $600,000 building which will house 150 employees and in emergency situations could be used to house 600 and is stocked with food and other survival items at company expense. Water is provided by a well in the sub-surface area. The additional construction cost of the new building was $1,500 as it involved only the addition of 2 inches more concrete flooring at the time the building was constructed.

(2) The Marotta Valve Co. in Boontown, N.J., has constructed shelter in their plant for 192 people.

(3) The Deering-Milligan Research Corp. at Spartansburg, S.C., is in the final construction stages of a shelter for 1,600 persons at a cost of $100,000 paid entirely by the corporation.

(4) The McDonnell Aircraft Corp., in St. Louis, has provided blast shelter for over 3,500 of their employees. These shelters average approximately 50 pounds per square inch and some consist of as much as 3 feet of reinforced concrete covered by 3 feet of earth. They are complete with ventilation, filters, and emergency communications equipment. Areas are available which, with slight modification, could provide blast protection for an additional 5,000 employees. Corridors, basements, and tunnels provide fallout protection for over 22,000. This company is participating in the shelter survey program and is giving consideration to improving other areas by additional protection construction.

(5) The Rohm & Haas Co. has provided shelters for their employees at their plants in Bristol, Pa.; Bridesburg, Pa.; Knoxville, Tenn.; and Houston, Tex. These shelters are complete with sleeping bunks, subsurface water wells, electric generators, ventilation, and shelter equipment, and are stocked with emergency food, medical, and other supplies.

(6) The Cleveland Twist Drill Co. built a shelter for 1,200 of their employees. In addition, this company is helping employees with their home shelter plans. For example, no-interest loans are made to employees which can be paid by payroll deductions. Free engineering and architectural service is provided, supplies and equipment as well as construction materials are made available at company quantity discount purchase prices, and training is provided free on company time at the workplace.

(7) The Cincinnati Milling Machine Co., in Cincinnati, Ohio, has constructed three shelters in its plants. One has a capacity for 13,000 people, another 11,000 people, and a third will accommodate 150 people.

(8) The Eastman Kodak Co., in Rochester, N.Y., is providing fallout shelter for their 17,500 employees. This company is developing a comprehensive civil defense plan in their plants.

SHELTERS IN FEDERAL BUILDINGS

An essential foundation to both the incentive program and the stimulation by technical assistance of unsubsidized shelter is the development of shelter space in Federal and military buildings.

Experience with Federal buildings is needed to expand further the body of technical information on antiradiation construction, test new ideas on lowering costs and develop cost data which can be meaningfully extrapolated and distributed on a nationwide basis to other governmental organizations and private institutions in the process of building similar buildings.

Experience derived so far this year has been valuable in determining the incremental cost of various types of protection. On one building—the Pittsburgh Federal Office Building—estimates existed for shelter space, including features for full chemical and biological protection, as well as radiation protection; it would have cost $150 per person. With minimum requirements for fallout protection only and close attention to lowering costs, we have revised the estimate to $19 per person. We have learned that standby auxiliary power and the necessary mountings and electrical connections are often accounting for nearly one-half of the cost projections for the shelter space. Pending further evaluation of power source reliability under attack conditions, we are holding this requirement in abeyance, but we are doubtful that this cost is justified on a national basis to meet the fallout hazard. The point is that we are bringing Federal standards into line with an austere program which can be afforded on a nationwide basis.

If those responsible for State and local government buildings, schools, hospitals, industrial buildings are to respond to the President's program by going to some expense to create shelter space, it is essential that the Federal Government do at least a comparable job on its own buildings.

There is a substantial potential for shelter space in large and small Federal and military buildings—space for an estimated 3.5 million people. A continuing program of adapting new and old structures to shelter purposes for both Federal employees and others living and working near these buildings contributes to the objective of meeting the national shelter requirement.

As the shelter program is oriented primarily toward dual-use construction, techniques must be developed to take advantage of foundations, walls and ceilings which are part of the normal construction pattern. Shelter must be incorporated in a broad spectrum of different building types. Federal and military hospitals, schools, plants, office buildings, etc., offer a useful range of experience. Estimates on Federal and military buildings have developed valuable information on the cost of incorporating different types of protection into buildings and this is one source of our optimism in projecting much lower costs for the national shelter program than are generally anticipated. This is the basis for establishing a low level of incentive—$25 a person—and expecting it to produce results.

SHELTER SUMMARY

I have here a chart which indicates our current estimates of the annual rates at which various activities may add shelter space to create the necessary fallout shield for the entire Nation. The band at the bottom of the chart shows our expectations from the current shelter survey and for the continuing survey program through fiscal year 1967. The totals are 50 million spaces from the survey funded in fiscal year 1962 and a continuing annual increment thereafter of 4 million spaces per year for a total of 70 million spaces by the end of fiscal year 1967.

A small element not shown, but included in the survey color bank, is shelter space to be built into Federal, civilian, and military structures. As mentioned earlier, the program calls for the provision of shelter space in new construction and modification. Nonmilitary buildings were started in fiscal year 1962. Shelters in military structures are proposed to begin in fiscal year 1963. The total through fiscal year 1967 is estimated at 3.5 million spaces.

The second color segment indicates estimated results from the proposed shelter incentive program. The average annual increment is shown at approximately 20 million spaces per year, for a total of 100 million spaces expected to be developed through Federal incentives.

The accelerated development of shelter space throughout the country; the impact of direct Federal action; the increased public understanding from a visible action program; the stepped-up Federal assistance; all of these will combine to generate substantial shelter space from public and private institutions and home owners. Although the private response may start slowly, it is expected to accelerate as the Federal program picks up momentum. But the chart does not attempt to estimate each annual increment, only average increments over 5 years. We have made an estimate, for purposes of developing the program of an average rate of 12 million unsubsidized shelter spaces per year, in addition to cost-free space in new construction picked up under the continuing survey. The 5-year total is 60 million shelter spaces.

In summary, these rough estimates add up to 233.5 million shelter spaces by the end of fiscal year 1967. This total would provide shelter for substantially all of the 1967 population, taking account of both residential and working population requirements. I believe it is useful to put forward these figures now to provide something to measure against when more reliable data becomes available as we move ahead.

STATE AND LOCAL SUPPORT

Civil defense is by law, and by its nature, a joint responsibility of the Federal Government and the State governments. An important element of the Federal program is directed toward support of State and local programs. The new program places a new urgency on local planning, organization, and education of people. We have been chipping away at the activities and the civil defense structure of the past to reorient and concentrate on this objective. There is a deep involvement of Federal, State, and local civil defense programs, one with the other. It would be a mistake to attempt change too abruptly and without careful and cooperative preparation by those concerned at all levels of government.

CIVIL DEFENSE TRAINING

We will continue four training schools operated by the OCDM in the past. All courses have been suspended except radiological defense, in order to revise the course material and integrate the schools with our program. The courses are being limited to qualified State and local civil defense officials and to instructors who will train others. A wide range of training courses has been reduced to five courses essential to the main purpose of the program. Standards have been developed for the matching funds program so as to gradually steer local survival plans toward a shelter-oriented civil defense program. Past plans for a widespread radiological monitoring system are being recast to tie the monitoring stations, where possible, to the community shelters emerging from the shelter survey and anticipated from the shelter incentive program.

We are calling in, reviewing, and in many cases obsoleting, a very large number of outstanding pamphlets, leaflets, films, tapes, and other vehicles for informing the public, which do not reflect the central problems on which we feel attention must now be focused if progress is to be made.

In short, we are lopping off fringe activities and applying the main resources of the program to the problem of survival at the local community level for the period of attack and the weeks immediately following.

In addition to operating its own schools, the Office of Civil Defense matches funds for certain civil defense training activities conducted by State and local civil defense organizations. About 90 percent of local emergency skills training is accomplished in this way. For this program the Office of Civil Defense is developing new training courses geared directly to priority needs. New criteria are being developed for State training centers, and a reporting system is being instituted to give the Office of Civil Defense a record of the training done. The

burden of administering this program will fall on the training, and education officers of our regional offices, working in close cooperation with State civil defense organizations.

The shelter program creates new training requirements. Under the 1963 budget we plan to develop and stock in marked shelters a supply of self-teaching packages which will help people to organize and manage themselves in shelter for an extended pin-down period.

JOINT CIVIL DEFENSE COMMITTEE

A new resource for producing the required civil defense training materials and for their active and effective use in communities is being closely studied by the Office of Civil Defense. The General Extension Division of the Association of State Universities and Land Grant Colleges and the Council on Extension of the State Universities Association are interested in establishing a joint civil defense committee. We anticipate that the preparation of materials can be done by selected colleges and universities and that contracts can be developed with a college or university to conduct a statewide civil defense emergency skills training program. Each contract would be drawn up with the cooperation of the selected school, the State civil defense director, and the OCD regional training officer. This approach offers the attractive possibilities of:

1. Reducing, on a nationwide basis, the total time needed to train the number of people required to perform vital shelter and other protective services.
2. Moving a large part of civil defense training closer to the people in a State.
3. Placing much civil defense training in the hands of experienced, competent instructors.
4. Making the prime source of civil defense training a respected State institution.
5. Reducing the need for large and permanent local civil defense training organizations.
6. Facilitating administration, evaluation, and accounting.

Overall in 1963 we plan to have a number of training packages developed to support these programs. The OCD schools will develop five packages to support the "back home" use of their own courses.

A big job of education of the public lies ahead. We approach it with caution. There is a danger of starting too much without adequate direction and precision in method and material suitable for public absorption. We are presently concentrating on two major programs, one in active operation and the other in an experimental phase.

The first of these is the adult education program. The Office of Civil Defense provides the course materials, technical information, and budgetary support for the adult education program. The primary purpose of this program is to give the interested, individual citizen an understanding in depth of his role and responsibilities. The course materials are now being brought up to date, and the program is being expanded from the 15 States participating in the program last year to 35 States by June 30, 1962. We are also requesting funds in fiscal year 1963 for the program to be extended to all 50 States. The program is administered by the Office of Education of the Department of Health, Education, and Welfare.

The second major program of public education is a medical self-help program, started under contract between the Office of Civil and Defense Mobilization and the U.S. Public Health Service and continued as a test operation by the Office of Civil Defense. The purpose of this course is to train one adult member of each family in medical self-help for a disaster period when professional medical care will not be available for days or weeks. It will train persons beyond the level of Red Cross first aid. The trial phase of the program is being carried on with interim materials in all 50 States. A summary and analysis of the results of this trial phase will be conducted jointly by the Office of Civil Defense and the U.S. Public Health Service. Unless this trial experience demonstrates overriding difficulties, we intend to implement this program in fiscal year 1963.

We also plan projects to inform and educate key groups and leaders that are of special significance to the success of the shelter program, such as educators, school administrators, industry, and hospital administrators.

As projected in the 1963 budget submission $5,185,000 will support the adult education program; $3,500,000 the medical self-help program; and $662,000 will support the special group training.

FEDERAL CONTRIBUTIONS PROGRAM

The final element in our support for State and local operation is the availability of Federal funds or surplus property to the States and their political subdivisions. This activity, which we call the Federal Contributions Program, has three components: first, matching funds for supplies, equipment, and facilities; second, matching funds for personnel and administrative expenses; third, donations of surplus property.

Last September interim new procedures for Federal contributions were instituted. The most important change, applicable to all types of contributions, is the requirement that there be a civil defense plan which we have an opportunity to review. This permits use of contributions as an influence on State and local planning to bring about a more coherent national civil defense effort. The interim revised procedures, for the processing of applications for supplies, equipment, and facilities, establish more explicit criteria for the approval of project applications by regional directors. Among other things, the new criteria specify that the regional staff, prior to recommending approval of an application for Federal funds, must make a determination, and record the factual basis for it, that:

(1) The local applicant has an operational plan consistent with the terms of the State civil defense plan;

(2) The local applicant has a legally constituted civil defense organization; and

(3) The local applicant has identified his specific civil defense needs, his requirements for operations and his otherwise available resources to carry out his civil defense program.

These interim procedures, as now carried out by the regional offices, introduce greater discretion and commensurate responsibility into the regional directors' decisions than was possible under past procedures. As a result of these new administrative and program practices, we can more accurately assure that the contributions program will produce predictable results which tie in to the reoriented national civil defense effort.

We are interested in having Federal money spent to carry out the specific objectives of the national civil defense program. Let me give you a quick illustration drawn from the personnel and administrative expenses program. Early in January 1962, each State was advised that a redefinition of its personnel and administrative expenses program paper was in order, and that the redefinition was to reflect the current emphasis being placed on the shelter program, as well as to justify the major staff effort and expenditures that would be made for this purpose. The States and localities are already submitting amendments to their program papers indicating their response to the request of the Office of Civil Defense and their support of the national shelter program. This shows that the Federal Government, the States and their localities can act rapidly and in concert to attain national program objectives.

FINANCIAL ASSISTANCE PROGRAM

In March of this year we will publish our guidance to the regional offices for the fiscal year 1963 financial assistance program. The regional field officers will assist the States in preparing their program papers for submission with matching fund applications to assure alinement with national program emphasis at that time. These program papers and the national program guide upon which they are based will then become the basis for all Federal financial and technical assistance rendered to State and local civil defense for the fiscal year.

Let me conclude by saying that we have assigned auditors to regional offices to insure the proper accountability of these programs.

WARNING AND COMMUNICATIONS ACTIVITIES

The new warning system, NEAR, will be installed over the next 2 or 3 fiscal years. The sum of $10 million was appropriated for this program in fiscal year 1962. For fiscal year 1963, $25 million is requested. This system, when in operation, will be capable of bringing instantaneous warning to homes, offices, and other buildings to greatly improve the Nation's warning capabilities.

The ability to detect and monitor radioactivity must continue to be improved; $15.8 million are in our fiscal year 1962 program and we are requesting $19.5 million in fiscal year 1963. These amounts will provide for the initial equipping of a national network of radiation monitoring stations which will be tied in with the shelter system. They will also provide for the procurement of aerial monitoring equipment and calibration equipment needed to maintain the radiation detection equipment.

Communications and control facilities, particularly at the State and local level, must be made more effective and less vulnerable. Accordingly, our fiscal year 1963 request for $10.1 million is almost double our fiscal year 1962 appropriation of $5.5 million. The major portion of this increase is programed for the protection of broadcast stations throughout the Nation. Such protection is necessary to assure radio communications with the population during and after an attack, to inform and instruct people on action they should take for their survival.

In fiscal year 1962, we initiated a program for the improvement of our damage assessment data base. Approximately $1 million was provided for this purpose. In fiscal year 1963, we will be moving into expanded development of a postattack damage assessment capability and improved data base. For the coming year $2.5 million are requested. The major part of this increase is for computer capabilities to process and evaluate the large amounts of data which are to be provided by the shelter survey and contracts with other agencies to build up the data base on such subjects as utilities, transportation, critical production, and other essentials of postattack survival.

RESEARCH AND DEVELOPMENT

Research and development to adapt civil defense programs to changing conditions of the future must continue at a high rate. Our fiscal year 1963 request of $17.7 million is $2.2 million more than our fiscal year 1962 program of $15.5 million. I will ask Dr. Strope, our Director of Research, to describe this program and its relation to other research activities bearing on the problems of survival from a nuclear attack. I believe it to be of major consequence to the future capability of this country to protect itself.

1962 FUNDING

Although the amounts shown on the financial charts and the amounts included in the budget justification books for the various programs are in agreement with the fiscal year 1962 schedules included in the President's budget for fiscal year 1963 (which is in accordance with Bureau of the Budget instructions and common practice), a continuing review is being made of the various programs and the related financial implications. For example, it now appears that the cost for stocking shelter spaces marked and identified under the survey will be substantially increased and that the cost of the survey itself will be less than the $81.8 million estimated in the President's budget estimates. We are reviewing estimates this month almost on a day-to-day basis to adjust to the rapid development of the program and the initial experience as we move into operation. In a totally new and unprecedented undertaking launched in the second quarter of the fiscal year, I expect refinements of estimates on a continuing basis and have no hesitation in returning to the Treasury any funds for which we cannot establish a clear requirement and capacity to commit that money in an orderly manner in this fiscal year. At present, it looks as though the full appropriation for fiscal year 1962 will be used.

The current state of our planning is shown in a funding plan dated March 1, 1962, which reflects the net changes from the President's budget document as of that particular date. All changes from the programs presented to the Congress, as well as the programs being implemented, have been reviewed and approved by the Secretary of Defense in accordance with Secretary McNamara's letter to Senator Robertson, dated August 3, 1961.

The 3-percent reserve is considered necessary until procurement costs on a number of major items are finally determined. This step is necessitated by the accelerating pace of a new program. The plan follows:

Proposed fiscal year 1962 funding plan
March 1, 1962

[In thousands]

Budget activity	1962 plan in 1963 President's budget	Recommended revised 1962 plan	Net changes to plan in President's budget
Shelter	$157,555	$162,208	+$4,653
National shelter survey	81,843	68,000	−13,843
Equipment and supplies stockage	58,212	74,800	+16,588
Shelter in Federal buildings	17,500	17,500	
Shelter support programs		1,908	+1,908
Warning and detection	26,868	21,868	−5,000
Warning and alert (NEAR)	10,000	5,000	−5,000
CBR instrument procurement and maintenance	16,868	16,868	
Emergency operations	22,522	15,786	−6,736
Training, education, and public information	14,477	7,674	−6,803
Survival services	1,522	1,661	+139
Communications and control	5,523	5,411	−112
Damage assessment	1,000	1,040	+40
Research and development	15,485	15,360	−125
Financial assistance to States	21,186	21,186	
Management	12,236	12,366	+130
3 percent for program changes		7,078	+7,078
Grand total	255,852	255,852	

EXPLANATION OF CHANGES

Shelter.—In this program the amount for the shelter survey has been reduced to the Corps of Engineers' current working estimate based upon the experience gathered to date through the initial surveys. The amount for equipment and supplies has been increased to cover current cost estimates provided by potential commercial suppliers. The current estimated costs of shelter stockage per shelter space is $2.50 for stocking the 30 million shelter spaces included in this year's program, but an all-out effort will be devoted to bringing these costs down as negotiations reach the contracting stage. The requisitions for shelter supplies will be placed with the Defense Supply Agency. The small amount proposed for shelter support programs includes professional advisory and statistical support services.

Warning and detection.—One-half of the amount appropriated for the national emergency alarm repeater system has been released for reprograming. The funds held for use on this system will be used to procure, install and conduct extensive tests of 10 new signal generators.

Emergency operations.—The cost of preparation, printing and distribution of the "Fallout Protection" booklet and related shelter publications has proved to be considerably less than the estimates developed last fall. This permits the release of a major portion of funds that previously were reprogramed to public information from the shelter program.

Three percent for program changes.—An amount of $7 million is being held for covering future requirements of shelter stockage for additional spaces above the 30 million, public information, expanded surveys, or other programs where urgent requirements may arise during the last few months of the fiscal year.

I have here five charts which will show the funding and projected results of this program.

The first chart (chart I) shows the funds in the DOD appropriation bill for fiscal year 1962, the funds transferred to us by the Bureau of the Budget out of OCDM's fiscal year 1962 appropriation and the total funds available for our fiscal 1962 OCD operations.

The second chart (chart II) outlines the funds requested in the President's fiscal year 1963 budget message for the civil defense function of the Department of Defense.

The third (chart III) indicates the commitment of fiscal year 1962 funds as of the end of February.

The fourth and fifth charts (charts IV and V) are estimates of costs and projected results in terms of fallout shelter spaces in the 5-year period fiscal year 1963 through fiscal year 1967.

(The charts follow:)

CHART I

DEPARTMENT OF DEFENSE... OFFICE OF CIVIL DEFENSE

FISCAL YEAR 1962 PROGRAM

(IN MILLIONS)

	FUNDS TRANSFERRED FROM OCDM	DOD APPROPRIATION	TOTAL
NEAR SYSTEM	–	$10.0	$10.0
RADIOLOGICAL INSTRUMENTS	$6.0	9.8	15.8
COMMUNICATIONS	2.0	3.5	5.5
TRAINING, TECHNICAL ASSISTANCE, PUBLIC INFO.	3.2	11.3	14.5
MATCHING FUNDS TO STATES		–	
Emergency Operating Centers (5.0)	21.2	–	(5.0)
Survival Supplies and Equipment (5.0)		–	(5.0) 21.2
Personnel and Admin. Costs (11.2)		–	(11.2)
MANAGEMENT	12.2	–	12.2
SHELTER IN FEDERAL BUILDINGS	–	17.5	17.5
SHELTER SURVEY	–	81.8	81.8
SHELTER STOCKS	–	58.2	58.2
RESEARCH AND DEVELOPMENT	2.0	13.5	15.5
OTHER	1.6	2.0	3.6
TOTALS	48.2	207.6	255.8

CHART II

DEPARTMENT OF DEFENSE...OFFICE OF CIVIL DEFENSE

FISCAL YEAR 1963 PROGRAM

(IN MILLIONS)

NEAR SYSTEM		$25.0
RADIOLOGICAL INSTRUMENTS		19.5
COMMUNICATIONS		10.1
TRAINING, TECHNICAL ASSISTANCE, PUBLIC INFO.		20.9
MATCHING FUNDS TO STATES		
Emergency Operating Centers	(8.0)	
Survival Supplies and Equipment	(6.0)	32.0
Personnel and Admin. Costs	(18.0)	
MANAGEMENT		14.6
SHELTER INCENTIVES		460.0
SHELTER IN FEDERAL BUILDINGS		35.0
SHELTER SURVEY		8.0
SHELTER STOCKS		48.0
RESEARCH AND DEVELOPMENT		17.8
OTHER		4.1
TOTAL		695.0

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CHART III

DEPARTMENT OF DEFENSE...OFFICE OF CIVIL DEFENSE

FY 62 PROGRAM

CUMULATIVE OBLIGATIONS

(IN MILLIONS)

AS OF FEB. 28, 1962
(INCURRED & IN PROGESS)

Near System	.3
Radiological Instruments	12.2
Communications	2.6
Training, Technical Assistance, Public Info.	4.6
Matching Funds to States	17.2
Management	7.5
Shelter in Federal Buildings	.9
Shelter Survey	59.2
Shelter Stocks	3.6
Research and Development	11.7
Other	3.3
TOTAL	123.1

CHART IV

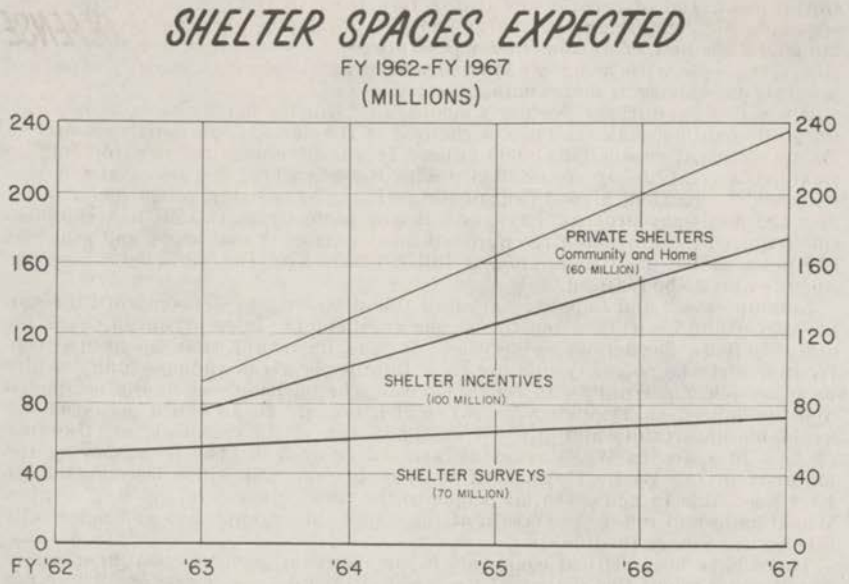
DEPARTMENT OF DEFENSE...OFFICE OF CIVIL DEFENSE
FY 63-67 SHELTER PROGRAM COST PROJECTION

	(IN MILLIONS OF $) TOTAL	FEDERAL
Shelter Survey (70 million spaces)	140*	140*
Shelter in Federal Buildings (3.5 million spaces)	140	140
Shelter Incentives (100 million spaces)	2,920	2,250
Private (60 million spaces)	2,400	
Total (233.5 million spaces)	$5,600	$2,530**

* Including FY 62 cost

** Estimated five-year cost for supporting activities (warning, communications, shelter supplies, training, organization at State and local level, etc.) brings the total five-year federal costs to about $3.5 million.

CHART V



SUPPLEMENTAL STATEMENT ON ORGANIZATION BY ASSISTANT SECRETARY STEUART L. PITTMAN

The organization of civil defense has certain unique characteristics and problems. It requires organization of an unusual set of relations and skills.

ORGANIZATION OF CIVIL DEFENSE

The President made it clear last July when he transferred civil defense responsibilities to the Secretary of Defense that the protection of the American population must be a coordinated effort using both military and nonmilitary measures. This requires greater integration of military and civil defense planning and operations than had taken place in the past. The location of the civil defense program in the Department of Defense has brought certain resources of that Department to bear on civil defense. This is an important change in civil defense organization.

Civil defense also involves other agencies of the Government. An important element of civil defense planning concerns continuity of Federal, State and local government in an emergency. The Federal Government must be particularly concerned with assuring that all of its essential elements are prepared to carry out their functions as fully as possible during and after an attack. Furthermore, many elements of the Federal Government are engaged in activities which can be so handled as to make important contributions to civil defense objectives. For these reasons it is undesirable to make civil defense the exclusive province of one element of government. The objective of the recent reorganization has been to preserve the necessary involvement of various agencies of the Government in civil defense and at the same time centralize the major responsibility for civil defense in the Defense Department.

After Executive Order 10952 was issued, July 20, 1961, there followed a very difficult and lengthy process of breaking the old Office of Civil Defense and Mobilization into two parts. Staff had to be divided, the unexpended funds had to be divided, and facilities, material, and records had to be divided. The result was the mass transfer on September 3, 1961, effective August 1, 1961, of 1,106 OCDM people to the Office of Civil Defense in the Defense Department out of a total ceiling of 1,650 carried on the OCDM records at that time. Of these 1,106, 41 were in Washington, 554 were in operational headquarters in Battle Creek, and 427 were in 8 regional offices, and 84 in other field positions. A small staff of 42 people was put together in the Pentagon, composed of persons transferred

from other parts of the Defense Department, of persons hired from outside the Government, and of certain key transferees from OCDM. This group was responsible for completing the reorganization, developing the new program, and launching the new operations under that program. It is important to note that the 1,148 people with which we started will be administering a greatly expanded program encompassing more complex activities.

It was decided during these early months that this top management and operating staff could not make full use of the rest of the national headquarters staff in Battle Creek, if separated by 600 miles. It was necessary for new top staff to establish a relationship of confidence with those working for them, and it was necessary to reorient a good deal of the thinking of the staff at all levels to reflect the necessary program changes. It was perfectly plain that to accomplish this required integration of the national headquarters in one place, and that this one place had to be Washington, if full utilization of Defense Department resources were to be realized.

Announcement and implementation of this decision was delayed until a sensible plan could be worked out to use the excellent facilities at Battle Creek for other Defense Department activities. It was important that the people confronted with the necessity to move their families be given an opportunity to size up other job opportunities in Battle Creek. The package was finally completed and announced on December 5, 1961, which brought to an end a period of unavoidable uncertainty and pressure on the morale of the organization. Because of lack of space in Washington we are still 2 or 3 months from moving the majority of the Battle Creek staff to Washington. But since December 5 we have been able to add essential people to the small nucleus of top staff here in Washington and relieve the strain at the top of the organization and more fully involve those down the line.

There have been critical comments in the course of congressional hearings in recent years about the quality of the Federal civil defense workers. There has been some anticipation both in the Executive Branch and among Members of Congress that the Defense Department would start fresh and build a new organization with mostly new people to go with a new program. I never faced the question on how far we could legally go in this direction, because I came to the conclusion in my first few months on the job, first, that it is very difficult to find useful experience for the kind of task in front of us; second, that a good deal of competence, dedication, and useful experience could be found among the OCDM transferees.

The transfer of national headquarters from Battle Creek to Washington is causing more than average attrition. As a result there is need and opportunity for new hiring to bring in added new blood.

It is my belief that the quality of my staff, or any staff, depends significantly on the conditions in which they work and the quality of their superiors. In the past the conditions for civil defense work have been highly unfavorable in that the resources to be effective have been lacking. It also seems to me that responsibility was not located with the visible operating activities, such as they were. There has been an excess of superstructure.

The internal organization of my office is designed to fix responsibility in national headquarters on about 20 units—operating divisions and staff offices. The operating units will have to show results which can be directly related to progress anticipated on particular pieces of the program. We have kept the organization flexible for this first 6 months of program development. It has now firmed up around the structure of the new program; not around abstract classifications of functions.

I have a chart here of the new organizational structure and another covering the former OCDM organization in order to show how organization has been adapted to program changes.

We have established a ceiling of 448 persons in headquarters and 600 persons in the eight regional offices. Another 100 are in the field training centers and field warning offices.

I attach particular importance to effective use of the eight regional offices under the direction of regional directors who will have increasing responsibilities. It is intended that a great deal of the operating activity will be carried out through the regional offices. The regional offices will take final action, subject to my review in special cases, on the commitment of funds for the program of Federal matching assistance to the States and for the proposed shelter incentive program. Regional offices will be equipped with the technical competence

necessary to support State and local survival planning and State and local participation in the programs, such as the survey, the shelter incentive program, radiological monitoring, warning systems, and communications.

USE OF DEPARTMENT OF DEFENSE RESOURCES

I will briefly identify the Defense Department resources which have been brought to bear in support of the civil defense program.

(1) As you know from the earlier testimony, the Army Corps of Engineers and the Navy Bureau of Yards and Docks are deeply engaged in the shelter survey and will be utilized on other parts of the developing shelter program.

(2) The newly formed Defense Supply Agency has taken on responsibility for procurement, receipt, storage, and issuance to the State and local governments of shelter supplies.

(3) The Defense Supply Agency has also assumed responsibility for the stockpile of equipment held for use of state and local civil defense organizations.

(4) The Defense Communications Agency is taking over responsibility for two civil defense communications systems.

(5) The Adjutant General's Office of the Army is taking on responsibilty for printing and distributing civil defense literature. They have a high volume and very efficient operation which is used by other elements of the Department of Defense.

(6) Legal services and legislative liaison services are provided by the offices of the General Counsel to the Secretary and the Special Assistant for Legislative Affairs.

(7) The Office of the Assistant Secretary of Defense (Public Affairs) has been handling civil defense public information activities. This support will continue for certain public information functions, but as indicated in the organization chart, we are in the process of creating a capability in the Office of Civil Defense to develop a public information program closely integrated with training and education and other related parts of the operation.

(8) The Defense Atomic Support Agency and the Weapons Systems Evaluation Group are the most important of the various elements of the Defense Department which are providing the means for a broad-based and continuing evaluation of the emergency conditions which the program is designed to meet and are providing data from which our small program evaluation staff can test the effectiveness of the shelter program, the damage assessment program, the warning system, and other elements of the developing civil defense system. My Director of Plans and Programs, Joe Romm, has devoted years to the intricate task of effective utilization of computer systems and other evaluation facilities, which are either in the Defense Department or to which the Defense Department has access. Sometimes knowledge of how to use these resources is more important than the arrangements reflected on paper.

CIVIL DEFENSE FUNCTIONS OF OTHER AGENCIES

An important element in the reorganization is the resulting relations between Federal agencies. Certain activities of agencies other than the Department of Defense or the Office of Emergency Planning are a part of, or related to, civil defense. Some of these activities are an integral and necessary part of the the new program which we are developing and operating. Others are no less important but do not tie so closely to our operations and are rather more closely related to the peacetime activities of the agency concerned.

We have entered into certain contracts, and are about to enter into additional contracts, with those agencies which have responsibilities under the Emergency Preparedness Orders which have just been replaced with nine Executive Orders. Other delegate agency activities supported by DOD civil defense funds have been cut out or curtailed. To illustrate, we have discontinued travel funds to support radiological monitoring training by the Departments of Agriculture and Interior and by FAA. We expect to accomplish such further training as is necessary through our own activities. A variety of programs in the fields of health, welfare, and manpower utilization which are related to civil defense are being oriented to the requirements of a shelter system and to immediate post shelter problems. The Weather Bureau upper wind data for emergency damage assessment and fallout forecast have been mechanized and adapted to facsimile transmission to State and local civil defense offices with expected lower cost and more efficient results.

For activities which we have decided to continue to support with funds under our control, we are using a contractual method to define our relations with the agencies concerned. In our judgment, we have improved definition of the product which is being called for under these contracts, over that previously outlined in the delegate agency agreement, the establishment of dates for performance under the contracts is necessary and my office must reserve the opportunity under these contracts to relate the funding to performance. The agencies concerned are cooperating in trying out this change in the nature of their relationship to certain civil defense activities.

The nine delegate agencies are requesting funds from Congress for fiscal year 1963 and the President has issued Executive Orders identifying the responsibilities of these agencies in the entire area of emergency preparedness planning and operations. A memorandum from the Director of the Bureau of the Budget to the President explains the purpose. Although these Executive Orders only incidentally cover activities which might be characterized as civil defense, it is our understanding that we will continue to use the contractual method of defining our relationship with agencies carrying out integral parts of the Defense Department's civil defense program.

RESPONSIBILITIES OF OFFICE OF EMERGENCY PLANNING

The Office of Emergency Planning has responsibilities under Executive Order 10952, which are closely related to those of the Secretary of Defense, and which will require a close working relationship with my office; Mr. McDermott and I intend to assure that this type of relationship continues to develop. OEP has responsibility for the resource management activities of the so-called delegate agencies, in addition to its own program for emergency planning and continuity of government. The Director of OEP will advise and assist the President in all emergency preparedness matters. I would anticipate that he would be particularly active in assuring that the independent responsibilities of the various departments and agencies are carried out in a coherent manner so that civil defense, resource management, continuity of government, and all other emergency planning and operations are adequately related. However, the Department of Defense will be responsible for the civil defense program which it is developing under Executive Order 10952, regardless of where in the Government a particular activity may be carried out.

A major characteristic of this new civil defense structure is the wide range of skills needed to carry out the program. Compare the type of people and organizations needed to operate the procurement, transportation, warehousing, and installation of shelter supplies for a nationwide shelter program with the personnel requirements for continual re-evaluation of assumptions made on the nature of the attack and its immediate effects. Compare the task of mobilizing the technical resources of the architects and engineering professions with efforts to create understanding of the idea of shelters in schools and acceptance by school boards, parent-teacher associations and school staffs. Again, the operation of schools for the training of State and local civil defense officials in a wide range of technical subjects bears little relationship to the development and operation of a vast system of data gathering and analysis which is the heart of the shelter survey program. The Federal civil defense organization, therefore, calls for many types of talent and an organizational structure to accommodate very different kinds of operations.

FOURTEEN CITY TEST

Mr. PITTMAN. The 14-city test is important to us because from this we are learning what we need to know to bring the State and local civil defense organizations into this very complex and difficult task of getting the building owners throughout the country to agree to open their space to the public and stocking and equipping the space, moving all the supplies into it.

We worked yesterday and today with the local civil defense organizations here in town to analyze the results of this test. We plan to move on now to the stage of actual stocking.

Mr. THOMAS. How many buildings are involved in your 14-city test?
Mr. PITTMAN. 141 buildings.
Mr. THOMAS. Taking care of how many people?
Mr. PITTMAN. 100,000 people.
Mr. THOMAS. That is quite important. That is one of your highlights.

SURVEY AND STOCKAGE

Mr. PITTMAN. I mentioned that the cost of this survey operation itself is $81.8 million. This was originally projected at $93 million; some months ago we reduced that estimate to $81.8 million, as shown in the President's budget, on the basis of cost reduction from this very highly systematized method that I described.

We are using the Army Corps of Engineers and the Bureau of Yards and Docks to contract with 600 architectural and engineering firms who will be conducting this survey. Stocking is done by the State and local government people. It is projected in the President's budget to cost about $58.2 million for the fiscal year 1962.

Mr. THOMAS. When you get to that part of the program in detail, you better be prepared to defend it. The committee has had relayed to it information that you had high school students doing this and the other rather than skilled engineers. We do not know whether or not it is true.

Proceed with your statement.

Mr. PITTMAN. We have here the people who will be able to give you the facts.

Mr. OSTERTAG. Is the $58.2 million for stocking a wholly Federal program?

Mr. PITTMAN. Yes, this is entirely a Federal cost and Federal procurement. The State and local government officials will receive these supplies and install them in the shelters. Procurement is a Federal cost.

We plan to continue this survey during this 5-year period as new buildings are created. We will pick them up under the survey and stock and equip them. We estimate about 4 million spaces will come in annually based on estimates derived from new construction figures.

Mr. THOMAS. We will go into those details later on.

AUTHORIZATION FOR SHELTER PROGRAM

Mr. PITTMAN. The incentive program is the new element.

Mr. THOMAS. While you are into that, may I respectfully ask you to address yourself as to whether or not this program has been authorized by the Congress. We have some doubts.

Mr. PITTMAN. It has not. We understand Mr. Vinson's committee has it on its schedule as soon as they finish their treatment of the military construction program. I think it is worth noting that the Armed Services Committee has just come out with a report on a military authorization bill for missile systems which points to the fallout problem created by the NIKE-ZEUS weapon system.

Mr. THOMAS. You might address yourself to existing law and see whether that is adequate.

Mr. PITTMAN. For the record, what I was going to read into the record is page 14 of that report, which has just come out from the Armed Services Committee, which points out the need for the protection of the civilian population against fallout. That is related to the NIKE-ZEUS system.

Your suggestion was what?

Mr. THOMAS. You might address yourself, if you see fit, to existing law that is on the books now.

Mr. PITTMAN. The reason why this is not adequate to authorize this program——

Mr. THOMAS. We did not ask you to say it was not adequate.

Mr. PITTMAN. We do not believe we can achieve our objective under a law which requires the funds to be allocated to States in accordance with target areas as well as population. We are not orienting this program according to the risks of the various target areas——

Mr. THOMAS. You have allocation to the States, on some would be formula in the law. But it is to the States?

Mr. PITTMAN. Yes.

Mr. THOMAS. No. 2, that word "matching".

Mr. PITTMAN. Correct. This means the States would have to put money into institutions which they are not authorized by their own laws to put money into.

For example, private schools and some public schools would be barred from the incentive if we proceeded in this manner. Hence we need new legislation.

POTENTIAL FOR FALLOUT SHELTERS IN SCHOOLS

The $450 million—we have in the record how we came to this estimate. I will skip along and simply say we have based it on estimates as to new construction and opportunities to modify existing space. The largest element by far in this estimate is the school system. It is $3.2 billion of new school construction projected for fiscal year 1963.

There is 200 million square feet of space that has a potential for building in fallout protection.

We do not estimate that the space that will result from the $450 million will all be in being by the end of 1963. But we think the funds will be obligated.

We anticipate 20 million people would be protected by the space created as a result of the obligation of those funds.

INCENTIVE SYSTEM PER CAPITA GRANT

The incentive we propose to offer is a flat grant of $25 per person sheltered. The way we compute it is 10 square feet per person or $2.50 per square foot, or the cost of creating the shelter space itself, whichever is less. There are many that feel this figure is much too low to accomplish the task. Here again, we have reason to be optimistic.

DUAL PURPOSE OF SHELTER SPACE

As the chairman has pointed out, the costs are very much lower than anyone realizes, when you create shelter space which is dual purpose in character, which is a part of buildings, which is built into the

normal construction of walls and ceilings. We believe most of the space created in this way will be dual purpose and will serve other peacetime purposes and not just be shelters.

This is a point of some significance if years hence other weapon systems take over. We would not have the Nation dotted with silos that are monuments to our current concern; we will have useful space.

CONTRACTS WITH ARCHITECTURAL AND ENGINEERING FIRMS

Mr. JONAS. Would you permit me to interrupt?

On page 17 you cite the case of the Deering-Milliken Research Corp. in Spartanburg, S.C., building a $100,000 shelter for 1,600 people. What does that do to your estimate of $15 per person?

Mr. PITTMAN. Well, if the country did what we are proposing, just met this minimum standard following our specifications, it would cost $5 to $6 billion. Some of the space already exists and costs nothing.

Mr. JONAS. Assuming they are not building an elaborate shelter, but an adequate one, it looks to me that the cost is about $60 per person.

Mr. PITTMAN. About $60. Some of the schools that have talked to us have been advised by architects and engineers that the cost per student of putting in this shelter space will run $150, even $250, per person. The architects and engineers that provide this advice are first-class professional people who have not had anyone in their office trained in the schools I have referred to, and do not know what protection requirements are necessary.

Mr. THOMAS. Off the record.

(Off the record.)

Mr. JONAS. You just hired 600 of them. If they are so incompetent, it appears you would have gotten somebody else to do your survey.

Mr. PITTMAN. They are not incompetent. None of them are. It is as though a lawyer who was a general lawyer were suddenly called upon to give advice on tax matters. Even though he had a good reputation and felt called on to do the best he could, he would not show up very well. The A. & E. firms who have not absorbed the new technology of antiradiation construction have given these higher cost estimates.

FALLOUT SHELTER SCHOOLS

The 600 firms we contracted with have all sent one or two people to these courses. They are qualified for this work and would use much more moderate requirements.

Mr. JONAS. I noticed 200 of them failed. They did not pass the course?

Mr. PITTMAN. Yes.

Mr. JONAS. That is strange.

Mr. PITTMAN. If some part had not failed, it would raise a question in my mind as to whether the course was any good. Usually some people fail a good course. This is 200 out of 2,000.

Mr. THOMAS. Is that not a misleading figure in your justification?

Some of them voluntarily withdrew. They did not want the business. It was not a question of intellectual capacity to pass the examination. It was a 2 or 3 weeks' course and perhaps they did not want

to take the time. You pick top firms. We realize that. Certainly anybody who has sense enough to work his way to the top in the A. & E. field has sense enough to pass your course.

Mr. PITTMAN. State and local governments have also sent people to these courses. It has not been just for the 600 firms.

SHELTERS PROVIDED BY OTHER MEANS

Mr. OSTERTAG. In your estimates or surveys do you have any figure as to the total number of shelters or the number of people that would be provided with shelter protection through these various and sundry corporations and large industrial operations?

Mr. THOMAS. They break that down in one separate category.

Mr. PITTMAN. We have estimated 12 million spaces a year for every source outside of the incentive program and outside of the survey. That includes industry, home shelters, anything that the State and local governments will do in response to the Federal program to put shelters in Federal buildings. We anticipate there will be a fair amount of shelter space from that source.

Mr. OSTERTAG. Is not Eastman Kodak making a study? This industry is located in my district. It will provide shelters for 17,500 people.

Mr. THOMAS. That is a good outfit.

Mr. PITTMAN. I believe I mentioned that in my statement. They are doing a good deal.

I will not pause over the technical assistance part except to say, since September, about 3,000 building plans have been reviewed by our office. We are putting out comments and suggestions at a high rate. We do not have the manpower to continue to do this in the way we have been doing it. We are switching over to maximum reliance on the professional talent in the country, putting the know-how out through them is more effective than through the Federal Government, except in special instances.

I will skip over the list of industry participation, which is simply to give you an idea that there will be a response, even though some people may feel this is the Federal Government's responsibility and why should they have to do it.

The evidence to date is there are many institutions in the country deeply concerned about the problem who are not waiting for the Federal Government to do something. They are quite prepared to do something themselves.

SHELTER IN FEDERAL BUILDINGS

The Federal buildings program is one of special interest, I understand, to this committee in the past. We are coming forward with a proposal that the Federal Government take hold and include Federal buildings in this national shelter program, to further the objective of providing shelter space for everybody. We think it would be very damaging to the program to call on schools, hospitals, industry and others to go to the expense of building shelter space, with or without Federal help, if the Federal Government itself does not take it seriously enough to put shelter space in its buildings.

SHELTERS IN MILITARY INSTALLATIONS

Mr. THOMAS. You are using the same reasons in military installations?

Mr. PITTMAN. Yes.

Mr. THOMAS. When you take both categories, you have a large segment of the overall building program.

Mr. PITTMAN. There is a very large inventory of buildings as you point out. We do not plan to do it all. We plan to apply the same standards that are applied under the national shelter program to pick up low-cost opportunities for shelter space, to only do it where there is a need, in the sense that there are not other buildings nearby that would provide enough shelter space.

We intend that these be community shelters, not just for the protection of military and Federal employees. If we were trying to protect Federal employees, this would be a continuity of Government justification, which is not the rationale of this program at all. We have not included any requests for funds in this budget for another task, which may or may not have to be done, which is to provide hardened sites, perhaps better than fallout protection for key Government operations and personnel.

Mr. THOMAS. When we get to that part of the justification we will go into that in some detail. You might prepare yourself to explain how John Public, who lives 3 miles from a military installation, will get in and enjoy that protection.

Mr. PITTMAN. May I say on that point that on fallout protection we probably have half an hour or more of natural warning time so that 3 or 4 miles is not necessarily a barrier, but it is getting close to being a barrier.

Mr. THOMAS. Congestion will be one.

Mr. PITTMAN. It depends on where you are located.

Mr. THOMAS. Please proceed.

Mr. OSTERTAG. You are talking about target areas?

Mr. THOMAS. Yes.

Mr. PITTMAN. He is referring to military buildings which might or might not be target areas.

COST OF FALLOUT SHELTERS IN FEDERAL BUILDINGS

I do want to point out, as I have here, that we have looked at many estimates from the other agencies and departments of the Government on what it would cost to put fallout protection into their buildings. When they first started coming in they were quite high, we thought. By working on the requirements as well as on the methods of construction, we have brought these down drastically.

I mentioned as an example the Pittsburgh Federal Office Building, down from $56 a person estimate to $15 a person estimate. This is partly by method of construction, but it is primarily changing the requirements—biological and chemical warefare protection had been included.

We are not proposing more than fallout protection for the rest of the country. We do not see any basis to propose more for Federal employees.

Mr. THOMAS. What has that been, 7 percent or 10 percent of the overall cost? Does anyone have that figure? Was it 5, 7, or 10 percent of the overall cost?

Mr. EVINS. Ten or twelve.

Mr. THOMAS. I had an idea it was 5 or 7. We will get that for the record.

Mr. PITTMAN. Paul Visher is our expert on this. Those estimates are high. The fallout protection cost factor is about 2 percent in the 1963 GSA construction program budget request.

The Federal buildings program has given us the input to estimate these lower costs. By experimenting with Federal buildings this year, reviewing plans, we have had one of a number of bases for setting our incentive level at this low figure of $25 a person.

The Federal buildings program will continue to provide data for development of the program and for planning.

Mr. THOMAS. Under existing law no Federal building, up until this year, has been permitted to install this additional feature. I do not know whether any has been constructed this year with those features in it. Based upon experience, I do not think you have any accurate figures to enable you to arrive at any cost. We say in here your costs are what we call "inhouse" estimates.

Mr. PITTMAN. I think you are largely right for new construction starts. It is a matter of timing. We do have $17.5 million in the Defense appropriation last year which we are committing to this purpose.

Mr. THOMAS. Certainly no dirt has been flying under that program, has there?

Mr. PITTMAN. I do not think there has been too much dirt as yet. Some of this does not require dirt. It as a matter of ventilation, doors, et cetera. We have started on the lower cost part of it, that is, the modifications of these buildings.

I do not know whether you want me to quickly review how we come up with this estimate that we can meet the national requirements in 5 years.

Mr. THOMAS. We will go into those details a little later on. We just want a general summation from you.

STATE AND LOCAL PARTICIPATION

Mr. PITTMAN. I want to emphasize the significance of State and local participation in this program. The alternative to State and local governments facing up to some very real responsibilities, and I think much greater than they have been facing before—operating responsibilities—is a very elaborate system of Federal agents training and educating the American public, moving shelter supplies into buildings, discussing with private building owners what space should be used for stocking and what space should be available for public use, what terms should go into the license agreements. I think it would be chaotic to inject the Federal Government into the local operating responsibilities of this kind of a program. If it were feasible to have a big public works project financed by the Federal Government to put quonset huts underground all over the country, maybe you could then do without major State and local responsibil-

ities, but even then I don't think it would work. This program is too involved with people. It is not a hardware program. The people of our country are going to have to learn how to use these shelters. They are going to have to participate in the development of them. Unless we forgo the opportunity of much lower costs by using space created for purposes other than shelters, I don't see how we can do this as a Federal project.

Mr. EVINS. Mr. Secretary, you can't spoon feed all the people.

DISTRIBUTION OF FALLOUT PROTECTION INFORMATION

Mr. OSTERTAG. On the point of relationship and cooperation between the Federal and State and local governments, I would like to call your attention, Mr. Secretary, to a matter that came to my attention here not too long ago with regard to your distribution of a pamphlet entitled "Fallout Protection—What To Know and Do About Nuclear Attack." The criticism of the method by which this was handled came through civil defense organization, based on the fact that it was distributed through the Post Office Department and their respective post offices, where people were required to request this material in person, rather than any direct contact or organized distribution through the civil defense organization.

The point is that the civil defense organization feels somewhat ignored in your sudden means of utilization of post office facilities. Do you care to comment about that?

Mr. PITTMAN. Yes. We are aware of this. We consulted with the State and local civil defense organizations, through their national associations, on the problem. We felt that the size of this distribution—it was projected at 25 million initially—would break the backs of many State and local civil defense organizations, if we were to dump these pamphlets on them and put the burden on them and their staff, or sometimes no staff, to find a way of distributing the pamphlets. We intended to put the pamphlets out quietly. We didn't want to send them to every door. We decided to do it in a way where only the people who wanted to read them would get them, particularly for a period of some weeks when we could observe the reaction to the pamphlet, in time to revise any part of it if we found it was misunderstood. We decided to distribute through the post offices, which have 31,000 outlets well distributed around the country.

There were some civil defense organizations that felt this was bad for them. When they communicated with us, we put orders out to the post offices to turn over their supplies to those civil defense organizations that wanted them and advised the civil defense organizations to go to the post offices, pick up the inventory and handle it themselves, if they were able. There was initial criticism of the kind you mention that reached us.

Mr. OSTERTAG. The point is that if you, on the one hand, are looking for organization and cooperation and at the same time you ignore it, it does not seem to me that your program is consistent with your policy.

ASSIGNMENT OF RESPONSIBILITIES TO LOCAL ORGANIZATIONS

Mr. PITTMAN. I can't agree with you. We have a problem here of having jobs to throw at these civil defense organizations that they can't possibly handle right now. The shelter survey and the supply problem is another example and a larger one. We have to proceed with some caution. It is very difficult to say that this civil defense organization is capable, and therefore we will handle it this way for them but over here we will have a different system. We have to have one system. We are inevitably in a position where some civil defense directors feel that we are going too slow in throwing responsibility at them and others feel we are going too fast.

INTEREST IN FALLOUT PROTECTION INFORMATION

Mr. JONAS. How many of the 25 million were picked up by individuals?

Mr. PITTMAN. We have gone into two more printings of 5 million each, making 35 million. Our latest estimate is that about 2½ million are still in the post offices.

Mr. THOMAS. Three million is in your justification.

Mr. PITTMAN. Maybe it is 2½ million now.

Mr. THOMAS. That is pretty good circulation.

Mr. JONAS. That is contrary to the impression I got from some newspapers, which reported that there was not any interest in these pamphlets.

Mr. PITTMAN. There have been mixed reports from the newspapers. Our impression is that there is a lot of quiet latent interest in this subject. It has quieted down certainly from some months ago but there is a good deal of demand for this kind of solid information.

Schools and institutions are very high on the list of orders for this publication. Industry, schools, colleges and other types of institutions are putting it out to their people.

We have touched on a good deal of the State and local relations problem here so I will pass on.

TRAINING AND INFORMATION

Training, public education, and public information tend to merge in some respect. There is a real difference between public information in the sense that we use it and training and educating people to do specific tasks—how to live in shelters, et cetera. We feel that the training of the population is probably right up on a level with the shelter system as a priority need and that a far greater effort is going to have to be made in this direction. Comparisons are frequently made with the Soviet civil defense program. The only clear conclusion you can draw is that they have, as you might expect, gone into training their population, educating them on these subjects, far more heavily than we have, put much more emphasis on it; I think more emphasis than on shelters.

I simply want to say if we are going to have a shelter system we are going to have to make a major effort in the training and informing of people. The two go hand in glove. If we are not going to have a

shelter system eventually, we don't need most of what we are asking for. In fact for my money we don't need a significant civil defense program. It would be limited to a few subjects, such as warning. The training and information money that we are asking for is, I think, a counterpart to the shelter program.

Mr. THOMAS. We agree with you.

Mr. PITTMAN. I am flipping a lot of pages.

The NEAR system I won't go into. We have another witness who is prepared to go into detail on that.

Mr. THOMAS. We will ask a lot of questions about that.

Mr. PITTMAN. The communications system; I think your concern may be primarily there with the new fact that we are merging that with the Defense Department's communications system in certain ways. We will describe that in detail if you like later.

RESEARCH AND DEVELOPMENT

Research and development, I indicated earlier, is of fundamental importance to this program. There is great danger in a civil defense program, or any program designed to meet a moving problem such as nuclear attack, that we will become too fixed on a program; if we persuade you and the authorizing committees to give us the money and legislation, then there is a program in being, and the tendency in Government is to stick to it, plunge ahead, come what may. This could be dangerous in this subject.

We have got to have the capability, first of all, to be on top of all research that bears on this field. It is usually directed at other purposes. It has a tail to it that concerns this subject. We have to be on top of whatever is being done in and out of Government.

Secondly, we have to redirect a lot of research activity in this country to this subject and stimulate it ourselves by financing the key projects. I think most of the opposition to civil defense comes from people who basically feel we don't know enough; that the research has not been done; and that we are going too fast here in proposing a shelter program before the research has been completed and accomplished.

This has troubled many concerned with the development of this program. We have come to a firm conclusion that we do know enough for a fallout shelter program, but we don't know enough about subjects which may be vital in the future.

Mr. THOMAS. We don't need a tremendous research program then. If you haven't "got the cart before the horse" you don't need this. We have been researching for 10 years in this field, starting with Bikini, with the test itself. We have brought into play our information from Japan, including the hospitals over there. We have Nagasaki and Hiroshima. We have had research contracts out at California on behavior of people.

Mr. PITTMAN. I would appreciate it if the committee could find time to have Dr. Strope give the basis for this research program.

Mr. THOMAS. We will give the doctor a lot of attention.

Mr. PITTMAN. I won't go into the status of the fiscal year 1962 funds.

Mr. THOMAS. We want you to go into what you want to.

ORGANIZATION OF CIVIL DEFENSE FUNCTIONS

Mr. PITTMAN. I can give you some overall flavor of our organization and reorganization problems. I am sure you will bring it out through questioning. I will not read it all.

There is a rather unique problem, it seems to me, of organization in civil defense. We are using, as I pointed out earlier, the facilities, personnel, the brains, of people who are not in our organization, to a very great extent. The center of the splash, you might say, is now the Office of Civil Defense and it ripples out to perhaps a dozen different agencies and organizations in the Defense Department, who have a capability which we could not duplicate economically. We can avoid particularly duplicating the superstructure, or the management, by making maximum use of these parts of the Defense Department. The same thing is true of other agencies of Government.

Mr. THOMAS. We want to commend you on your good, common horsesense and your managerial and executive ability, using these existing setups in DOD.

Mr. PITTMAN. I would like to make one general statement. There has been a lot of critical comment about civil defense workers at the Federal, State, and local level.

Mr. THOMAS. You mean the courthouse boys?

Mr. PITTMAN. You could not call the Federal people the courthouse boys.

Mr. THOMAS. City hall boys, as we call them?

Mr. PITTMAN. Yes, the merit-system boys. On the Federal level, we had to make a decision fairly early after I came aboard as to whether we were, in effect, creating a new organization here as a part of the Defense Department, or whether we were building on or making maximum use of OCDM people. We did not know at that time to what extent we would continue many parts of the OCDM program.

My decision was to go slow on cleaning house, you might say, and starting with new programs and new people. I am very glad that that was my decision.

We have, I think, a very competent group of people managing this program, who are somewhat anonymous types, but very effective. With their help, I have come to know where the talent is in the inherited organization. There is a great deal more of this than you might have suspected from the results which have been apparent in the past few years. These people have been without resources, without opportunity to do anything with a program, it seems to me, of very scattered objectives.

I am very much encouraged by the quality which has shown up here. I would like to say that on this record, having read over some of the past records from which I gathered generally critical comment.

TRANSFER OF CIVIL DEFENSE TO DOD

Mr. OSTERTAG. Mr. Chairman, at either this point or at some point in the record, it would seem to me that we should have the Executive Order with regard to the transfer of this agency to the Defense Department. Perhaps it might be well to place it in the record at this point.

Mr. THOMAS. Insert it at this point in the record.
(The document referred to follows:)

EXECUTIVE ORDER 10952—ASSIGNING CIVIL DEFENSE RESPONSIBILITIES TO THE SECRETARY OF DEFENSE AND OTHERS

Whereas the possibility of enemy attack upon the United States must be taken into account in developing our continental defense program; and

Whereas following a thorough review and consideration of our military and nonmilitary defense activities, I have concluded that adequate protection of the civilian population requires a substantial strengthening of the Nation's civil defense capability; and

Whereas the rapid acceleration of civil defense activities can be accomplished most effectively and efficiently through performance by the regular departments and agencies of government of those civil defense functions related to their established roles and capabilities; and

Whereas I have concluded that the undertaking of greatly accelerated civil defense activities, including the initiation of a substantial shelter program, requires new organizational arrangements:

Now, therefore, by virtue of the authority vested in me as President of the United States and Commander-in-Chief of the armed forces of the United States, including the authority contained in the Federal Civil Defense Act of 1950, as amended, and other authorities of law vested in me pursuant to Reorganization Plan No. 1 of 1958, it is hereby ordered as follows:

SECTION 1. *Delegation of Authority to the Secretary of Defense.* (a) Except as hereinafter otherwise provided and as is reserved to the Office of Civil and Defense Mobilization in section 2 of this order, the Secretary of Defense is delegated all functions (including as used in this order, powers, duties, and authority) contained in the Federal Civil Defense Act of 1950, as amended (hereinafter referred to as the Act), vested in me pursuant to Reorganization Plan No. 1 of 1958 (72 Stat. 1799), subject to the direction and control of the President. Such functions to be performed by the Secretary of Defense, working as necessary or appropriate through other agencies by contractual or other agreements, as well as with State and local leaders, shall include but not be limited to the development and execution of—

(i) a fallout shelter program;

(ii) a chemical, biological and radiological warfare defense program;

(iii) all steps necessary to warn or alert Federal military and civilian authorities, State officials and the civilian population;

(iv) all functions pertaining to communications, including a warning network, reporting on monitoring, instructions to shelters and communications between authorities;

(v) emergency assistance to State and local governments in a postattack period, including water, debris, fire, health, traffic police and evacuation capabilities;

(vi) protection and emergency operational capability of State and local government agencies in keeping with plans for the continuity of government; and

(vii) programs for making financial contributions to the States (including personnel and administrative expenses) for civil defense purposes.

(b) In addition to the foregoing, the Secretary shall—

(i) develop plans and operate systems to undertake a nationwide postattack assessment of the nature and extent of the damage resulting from enemy attack and the surviving resources, including systems to monitor and report specific hazards resulting from the detonation or use of special weapons; and

(ii) make necessary arrangements for the donation of Federal surplus property in accordance with section 203(j)(4) of the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 484(j)(4)), subject to applicable limitations.

SECTION 2. *Civil Defense Responsibilities of the Officer of Civil and Defense Mobilization.* The Director of the Office of Civil and Defense Mobilization shall—

(a) advise and assist the President in:

(i) determining policy for, planning, directing and coordinating, including the obtaining of information from all departments and agencies, the total civil defense program;

(ii) reviewing and coordinating the civil defense activities of the Federal departments and agencies with each other and with the activities of the States and neighboring countries in accordance with section 201(b) of the Act;

(iii) determining the appropriate civil defense roles of Federal departments and agencies, and enlisting State, local and private participation, mobilizing national support, evaluating progress of programs, and preparing reports to the Congress relating to civil defense matters;

(iv) helping and encouraging the States to negotiate and enter into interstate civil defense compacts and enact reciprocal civil defense legislation in accordance with section 201(g) of the Act; and

(v) providing all practical assistance to States in arranging, through the Department of State, mutual civil defense aid between the States and neighboring countries in accordance with section 203 of the Act;

(b) develop plans, conduct programs and coordinate preparations for the continuity of Federal governmental operations in the event of attack; and

(c) develop plans, conduct programs and coordinate preparations for the continuity of State and local governments in the event of attack, which plans, prorams and preparations shall be designed to assure the continued effective functioning of civilian political authority under any emergency condition.

SECTION 3. *Excluded Functions.* The following functions of the President under the provisions of the Act are excluded from delegations to the Secretary of Defense made by this order and are reserved to the President:

(a) Those under subsections (h) and (i) of section 201 of the Act (50 U.S.C. App. 2281 (h), (i)) to the extent that they pertain to medical stockpiles and food stockpiles .

(b) Those under the following provision of the Act: Sections 102(a), 201(b), and 402 and Title III.

SECTION 4. *Transfer of Property, Facilities, Personnel and Funds.* Subject to applicable law, there shall be hereby transferred to the Secretary of Defense such portion of the property, facilities, and personnel of the Office of Civil and Defense Mobilization engaged in the performance of the civil defense responsibilities herein assigned to the Secretary of Defense as shall be agreed upon by the Secretary and the Director of the Office of Civil and Defense Mobilization together with such portions of the funds currently available for those purposes as shall be approved by the Director of the Bureau of the Budget.

SECTION 5. *Reports.* The Secretary of Defense shall annually submit to the President a written report covering expenditures, contributions, activities, and accomplishments of the Secretary of Defense pursuant to this order.

SECTION 6. *Redelegation.* The Secretary of Defense is hereby authorized to redelegate within the Department of Defense the functions hereinabove delegated to him.

SECTION 7. *Amendment.* The Director of the Office of Civil and Defense Mobilization is hereby relieved of responsibilities under the Act except as otherwise provided herein, and the provisions of Executive Order No. 10773, as amended, are amended accordingly.

SECTION 8. *Prior actions.* (a) Except to the extent that they may be inconsistent with the provisions of this order, and except as particular Executive orders or other orders are amended, modified, or superseded by the provisions of this order, all determinations, authorizations, regulations, rulings, certificates, orders (including emergency preparedness orders), directives, contracts, agreements, and other actions made, issued, or entered into with respect to any function affected by this order, and not revoked, superseded, or otherwise made inapplicable before the date of this order, shall continue in full force and effect until amended, modified, or terminated by the President or other appropriate authority; but, to the extent necessary to conform to the provisions of this order, any of the foregoing shall be deemed to refer to the Secretary of Defense or other appropriate officer or agency instead of, or in addition to, the Office of Civil and Defense Mobilization or the Director thereof.

(b) This order shall not terminate any delegation or assignment of any substantive (program) function to any delegate agency made by any emergency preparedness order heretofore issued by the Director of the Office of Civil and Defense Mobilization (26 F.R. 651–662; 835–840) (which emergency preparedness order shall remain in effect until amended or revoked by or at the specific direction of the President). No such emergency preparedness order shall limit

the delegation or assignment of any substantive (program) function to the Secretary of Defense made by the foregoing sections of this order.

SECTION 9. *Effective Date.* This order shall become effective on the first day of August, 1961.

JOHN F. KENNEDY.

THE WHITE HOUSE,

July 20, 1961.

HIGHLIGHTS OF EXECUTIVE ORDER 10952

Mr. OSTERTAG. I would think it might be well for you to give us the highlights of it.

Mr. PITTMAN. Yes. The Executive Order's primary purpose was to transfer the civil defense program, as we normally think of it, to the Defense Department. There remain activities in other agencies of the Government which are very important to civil defense and to emergency preparedness.

Mr. OSTERTAG. There must have been some reasoning behind it. What was the basic reasoning?

Mr. PITTMAN. Several reasons. One was recognition that civil defense was an integral part of the national defense. I think that was the main reason. The kind of exercise we have gone through here as I have described the studies which went into making the basic decision that a fallout shelter was the right answer. I cannot conceive of this having been effectively done by an agency which labored under the restrictions of OCDM in the past. They could not participate in the analysis of the whole problem we are dealing with. I think that is one point. The hands and feet of the Defense Department are also immensely valuable to an effective civil defense program. I refer to the organizations described in my statement.

The present Secretary of Defense is absolutely invaluable to the program, to bringing about the kind of decisions which have to be made and carrying them through and making it clear that this is serious business, in contrast to the past. I think the confidence the President has in the Secretary of Defense must have been a factor which led to this transfer. This is looked upon by most of the top people in the Government as a very difficult and not very appealing task, which anyone would like to be rid of but there is no way in sight to get rid of the problem.

CIVIL FUNCTIONS OF THE MILITARY IN POST-ATTACK SITUATION

Mr. THOMAS. Mr. Secretary, to answer directly Mr. Ostertag's question, is it not generally assumed that if the country gets in trouble, the military will have to take over this function in 5 minutes? We might as well start out and put first things first in the Department. Is that not really the underlying answer to it?

Mr. PITTMAN. Mr. Chairman, I really do not think it is. Look at the kind of picture we see immediately following a nuclear attack. We figure maybe 4 to 5 percent of the country would be in the chaotic condition which results from the direct effects of the explosions. There the military may be the only resource to create order out of chaos and salvage what there is. But in the rest of the country, of which there is a great deal, everybody will be pinned down for a period of time, up to 2 weeks. They will come out. There will not be widespread physical damage around. If they survive, the people who have

been responsible for law and order and government functions will be there and they will pick up the pieces. The military also are going to be pinned down during this period. I do not think it is at all clear that the military will take over this country in a post-attack period. In fact, I think it is rather unlikely. The opportunities to plan and mobilize military resources for post-attack purposes are very great. There has been planning, but I do not think they are adequate. We are just getting to the point where we can improve them. This is one reason for putting civil defense in the Defense Department. This may be what you are thinking of, Mr. Chairman. But I do not think it is fair to conclude that the entire problem will be turned over to the military.

Mr. THOMAS. We are not going to have curfew at 8 o'clock every night in certain sections of the country, either, and trial by military court. Everybody will not be pushed around by some general or admiral, but the basic function is still a military function, or else the President would not have transferred it over. Certainly, in your preparatory field, it is a military function. You have the facilities in the DOD to carry it out more expeditiously and, we hope, more economically.

NEED FOR CIVILIAN PARTICIPATION

Mr. PITTMAN. I would like to say, the President and Secretary McNamara and all concerned have gone to some pains to make it clear that the civilian complexion has to be preserved; that civilian protection probably is impossible without civilian participation. This is a fundamental conclusion we have come to. We realize this is an issue on which people may disagree. It is of some note that the Defense Department has come to that conclusion. You might expect them to come to a different conclusion.

Did you mean me to address myself to the general proposition of why it was put into the Defense Department, or did you want to go into the details?

Mr. OSTERTAG. The question of the general theory as to the transfer from OCDM to the Defense Department, why it was desirable, necessary and justified is the answer we seek.

Mr. PITTMAN. I think that has been the burden of my comments.

RESULT OF REORGANIZATION

The reorganization resulted in splitting the OCDM structure in two parts. We have charts which show how this was done. The only general comment I would make is that we came off with the civil defense operating people without a commensurate part of the superstructure, and that we have kept what I call "superstructure" down to something quite manageable in the development of the organization since we have taken it over. I think this makes for a more effective operating organization.

Mr. OSTERTAG. Do you plan a drastic reorganization throughout the country?

Mr. PITTMAN. Reorganization of——

Mr. OSTERTAG. Your civil defense organization.

Mr. PITTMAN. No, we do not. We expect to devote this year to a program of concrete action which will tell us a lot about what the State and local governments, not just the civil defense organizations, can create, and if they are able to do the job that has to be done, this we think is the best way to do it. If they are not quite able to, or not able to at all in some places, we would analyze the need. We will be simultaneously during this year exploring ways in which we could supplement State and local resources, if needed. We are looking closely at any opportunities to use the military Reserves, the National Guard and other military resources, which might be helpful in the training end of this program, for example.

Mr. OSTERTAG. That somewhat ties in with the Chairman's point of military jurisdiction and military management.

Mr. PITTMAN. Yes. But, as I say, our conclusion has been that this, if it is going to happen at all, should be supporting. I am now talking about the preparatory stages. It probably is going to happen to some extent. It is a matter of degree. We are not going to take the responsibilities back from the States. As a matter of law, it is a joint responsibility, but as a practical matter it has to be, in my opinion. If we find it cannot work entirely that way, we may have to modify the relationship in some degree, it is true. We will keep our minds open on this during this first year of experience.

The whole subject of the nine other agencies, what they do, how we have been working with them—suppose I leave this to your initiative, Mr. Chairman.

Mr. THOMAS. That is an old subject with us.

That is a very, very excellent statement. We want to commend you for it. You have put a lot of time and thought into it. It really summarizes your programs in great detail.

Mr. THOMAS. Mr. Jonas, have you any general questions?

Mr. JONAS. I have one for the Secretary, if I may.

BASIS AND TIMING OF PROGRAM

This whole program is justifiable only on the basis of a possibility of a nuclear attack on the United States; is that right?

Mr. PITTMAN. That is correct.

Mr. JONAS. That being so, and if the danger is sufficient to justify embarking on a nationwide shelter program, why isn't it important enough to do it on a crash basis? If you start a program you can't finish for 5 years, that won't be any good to anybody in the fifth year if the attack comes in the fourth year, or earlier.

If the program is justifiable at all, why are you not in here recommending that it be done immediately?

Mr. PITTMAN. In the first place, we are only proposing to provide a margin of protection—not by any means total protection—for the American population. We are not attempting to gear our objective to security by a certain time. We are gradually increasing the chances of survival of the American population from the beginning of this program right to the end of the 5-year spectrum. It is then a matter of degree, the amount of protection we are shooting at.

Mr. JONAS. Is it not a matter of economics? You do not want to spend that much money? It is economic, is it not?

Mr. PITTMAN. It is partly that. It is partly the involvement of institutions, civilian life, State and local government. We have come to the conclusion that this is necessary to get the kind of product we want. You cannot move as rapidly as you could in the creation of a missiles system, or some defensive structure that is under your control, if you are involving the whole country.

I would also like to add the program really is not designed to meet a crisis that we can see. The program is designed to meet the assumption we are making that we may be for several decades exposed to a certain kind of risk. It is a long-term risk, it is an increasing risk. We may be a little late in getting started. It is urgent to get started, but to do it on a crash basis, we think, would result in the wrong kind of decisions being made and the wrong kind of a program.

Mr. JONAS. You have to make a dangerous assumption, namely that there won't be any need for this program for 5 years, that you will have time to complete it over a 5-year span; is that correct?

Mr. PITTMAN. That is right, except that we will have increasing benefits from it during the 5 years, particularly if we have increasing training and put enough information out to the people of this country so that they know what to do.

This pamphlet we put out, we think, would save millions of lives, if it is absorbed, without another thing being done.

Mr. JONAS. I am not questioning that or quarreling with it. We have gone along with substantial sums in this committee for civil defense programs in the past, but it is your plan to embark on a brand new one which envisages building fallout shelters to give complete protection to 50 million citizens and provide day-and-night protection for the entire population and you are justifying your program to accomplish that spread out over a 5-year period. To be effective and if the danger is real enough to embark on such a program I should think it would be real enough for you to recommend that we do it on a crash basis. I wanted to know the reasons why you do not make that recommendation.

Mr. PITTMAN. In addition to the reasons I have mentioned, we see a rising potential danger in the sense that the enemy capability will be greater several years from now than it is today.

Most of the public discussion of the hazard of nuclear war is predicated on a level of attack and a type of attack that would not be possible today. An attack would be possible but it would not be anything like the devastation which is assumed in much public discussion of this matter.

Therefore, there are several years ahead of us in which we will be increasing the measure of protection with an increasing potential destruction.

Mr. JONAS. Mr. Chairman, that is the only general question I had. My other general questions deal with costs of shelters and the type of protection provided by them, but I think they should come when we get to that section.

CIVIL DEFENSE IN THE SOVIET UNION

Mr. OSTERTAG. I desire to raise the question in regard to comparison with the Soviet Union. I refer to conflicting reports from time

to time as to what the Soviet Union has done or is doing in connection with this whole problem of fallout shelters and protection.

Have you any information on this subject?

Mr. PITTMAN. We do have continual input from intelligence sources on the subject. I think I can say generally it is a picture of a considerable amount of effort going into the creation of shelter space in past years and it is much less clear in the last couple of years. There is a continuing effort to educate people as to what to do in the event of all-out war. I would say they have greatly exceeded our effort on what we do for our people in training and education. They have done more in creating a shelter capacity over a period of years. How their current effort would compare with our proposed current effort is less clear. They are not doing as much in public view as we propose to do at this point in time. It is very difficult to determine what they are doing because a good deal of it is likely to be done in buildings to which our travelers do not have access.

There is one other point: They have an extensive rural population, as you know, who lead a relatively primitive existence. The people make use of underground dugouts for root cellars and other farm purposes as we used to do in this country. So there is a fair amount of natural shelter space to protect their rural population.

I would guess their rural population is better protected than our rural population.

SOVIET SHELTER PROGRAM

Mr. OSTERTAG. There have been conflicting reports as to what the general activities and responsibilities of the Soviet Union are in this field. I might point out that contrary to the reports that they have an extensive program, that they have actually done very little.

Mr. PITTMAN. I think we know they have done quite a little. The question is what they are doing now. I think that is less clear, on shelters.

Mr. THOMAS. What have they done on shelters?

Mr. PITTMAN. In the past?

Mr. THOMAS. Yes.

Mr. PITTMAN. The information we have, and I think most of it has been reported publicly, is that they have had a requirement for some years applying to new construction that shelter space be created in certain types of large buildings. They appear to have adapted their subway systems in certain cities to a shelter purpose. That would be two illustrations.

Mr. THOMAS. I made that inquiry and looked myself, but I do not see anything about it. The Embassy had no information on it. I tried to dig some up. We had a letter from the New York Times correspondent in Moscow a year or a year and a half ago on this subject matter.

Mr. PITTMAN. We do not contend the Russian activity in shelters is a justification for our request. We would request this in any event.

EUROPEAN INTEREST IN SHELTER PLANS

Mr. THOMAS. We have talked with the people in England, France, Germany, Turkey, and there is not the slightest bit of interest in a shelter plan any place in Europe. I talked to a German who was in

this country less than 2 weeks ago, a man in a very good position to know what he is talking about, to observe, and he said there wasn't the slightest effort, other than making one or two studies, giving it consideration, and perhaps that is true in France, England, Spain, and Italy.

Mr. JONAS. I was talking with some people last fall in Berlin inquiring why there didn't seem to be any panic among the citizens, and that was when the crisis was on. The answer was: "Well, we are not going to be the target. They are going to fly over to us. The panic ought to be in the United States or somewhere else."

Mr. THOMAS. I know there is absolutely no interest and no panic and that may be the answer. But what about England and France? I talked to the OCD Director in England, a very distinguished gentleman and a very learned man. He said, "Frankly, we have the same problem you have in the United States. We are trying to get them interested, but nobody is interested."

Mr. PITTMAN. Their Government is not exciting much interest by saying the thing to do is to evacuate cities, which was recently announced.

Mr. THOMAS. How recently was that?

Mr. PITTMAN. It was in the papers—a few days ago, wasn't it? A plan for evacuation of London.

Mr. THOMAS. When are they going to do the evacuating?

Mr. PITTMAN. And to where, that is my point.

Mr. OSTERTAG. Of course, we must recognize that there is a calculated risk involved in present-day cold war tensions, but isn't it reasonable to say that by virtue of our terrific capability, our retaliatory strength and power, that it is and has been accepted and regarded as a real deterrent to an attack and that our strength has increased rather than decreased and that the chance of an attack on the United States has been considerably diminished over the months?

Mr. PITTMAN. I would agree with all you have said except the last. I would hesitate to arrive at any conclusion one way or the other, on changes in risk of attack over a period of months. I do not think the risk can be measured in terms of our increasing strength. The Russians are increasing their strength. I think the danger is in miscalculation and accident and misjudgment, limited wars getting out of hand. I do not think it is a probability, but it is the considered judgment of the Executive Branch that this is a real enough possibility to call for an effective civil defense program.

CURRENT PROGRAM AUTHORIZATION

Mr. OSTERTAG. Now, changing the subject slightly, can you give us a general estimate of what part and how much of your program by virtue of transfer of authority and other factors is currently authorized by law and how much of your program is not?

Mr. PITTMAN. It is all authorized by law except for the $450 million shelter incentive program. We have asked for clarification of the authority to provide shelter space in Federal and military buildings. The only question there, I think, is on the Federal buildings. We thought it would be well to register for the first time, by amending the law, that this is part of a national shelter program and not some-

thing unique to Government; and, secondly, eliminate any possible doubt about authority. I believe this committee has from time to time raised the question as to whether there was adequate authorizing legislation for shelters in Federal buildings, so we have proposed that this be cleared up in this amendment to the Federal Civil Defense Act.

Mr. OSTERTAG. Then the point is that the entire program is a matter of authorization by law as of today except the shelter program?

Mr. PITTMAN. This would be our conclusion.

Mr. OSTERTAG. And that part of the program would be in the form of dollars on an assistance basis?

Mr. PITTMAN. That is correct.

Mr. OSTERTAG. Except as it might relate to Federal buildings.

Mr. PITTMAN. The incentive program does not relate to Federal buildings, so your statement is quite correct. It is a grant offered to institutions of various kinds that are eligible under this proposed program.

SHELTER STOCKAGE CRITERIA

Mr. YATES. I want to ask some questions on how they arrive at a 2-week period for stocking shelters, for example.

Mr. PITTMAN. We have arrived at a conclusion for planning purposes that a shelter occupancy should be scheduled for 2 weeks. We think it will be less. We think the opportunity to go out of these shelters, under most of the assumptions we have made, would probably take place in a few days, for short necessary trips, that is.

Now, this is again a matter of degree. People who have been exposed to an initial dose and know it, a fairly considerable dose of radiation, will have to be much more careful than other people. Many people may consider it advisable to keep children, or people who have already been exposed to quite a dose, in sheltered areas at night. Their homes will provide some reduction in the residual radiation, but maybe not enough; and in some situations these shelters would be occupied for sleeping purposes beyond the 2-week period.

Mr. YATES. Then we find out first the type of attack you envision to stock this for a 2-week period? Doesn't your shelter depend in great measure on the nature and size of the attack?

Mr. PITTMAN. Yes; the use of it does. The attack would have to be measured in the number of roentgens per hour that would be created in a particular place and it would depend on the proximity to the point of detonation.

I believe that the 2 weeks' assumption——

Mr. ROMM. The 2-week shelter occupancy applies right at the zone where you would escape blast and fire, where the radiation levels would be high enough to require continuous protection for 2 weeks. You will recall this radiation deteriorates at a fairly rapid rate. It is reduced 90 percent for every multiple of 7 in time. The theoretical intensity at the 1st hour is reduced to 10 percent of that level at the 8th hour and to 1 percent of that level by the 49th hour.

CONDITIONS EFFECTING RADIATION LEVELS

Mr. YATES. How do you translate this in terms of a 20-megaton attack, for example, in terms of proximity? I assume the closer you get to it, the greater the radiation peril?

Mr. ROMM. It depends entirely on the wind patterns and velocities that day.

Mr. YATES. The closeness to the point of impact of an explosion is not important?

Mr. ROMM. It is important, but not the sole determinant, particularly in an overall attack.

Mr. PITTMAN. You are generally right, it would increase the level of radiation.

Mr. YATES. The Doctor behind you seems to be shaking his head while you are saying yes.

Mr. PITTMAN. Let him shake his head on the record.

Mr. STROPE. The peak fallout area could be a considerable distance downwind from the point of impact. It depends on winds aloft at the time as to exactly where it occurs.

For example, in the test where certain natives were accidentally exposed in 1954, the peak apparently was something like 70 miles downwind. The reason for this, of course, is that the peril and the radioactivity formed by the explosion rises to a considerable altitude, very high, and that subsequently is falling out. This takes a period of time and during this time it is moved by the wind structure.

The conditions under which the peak could necessarily occur in the main physical damage region would be under extremely light winds which in general do not exist at these altitudes. You could consider it to be almost a negligible situation.

Mr. PITTMAN. The stocking of these shelters does assume 2 weeks' occupancy. But even if the shelters had to be occupied part-time for a longer period, there would be ample opportunity to go to iceboxes, to retail stores and return with supplies, with whatever is in the pipeline. We would be able to move around after the radiation level is low with some restriction.

Mr. YATES. Suppose you are in an area where fallout is heavy, can you move around without restriction?

I think the general public has the idea once the explosion takes place you are going to go to the shelter and you are going to stay in the shelter. Is yours a different idea?

Mr. PITTMAN. I think you are right, there is not a sufficiently widespread understanding of the speed with which the radiation level dies. It drops off extremely sharply. Only about 1 percent of the H-plus-1-hour radiation remains after 49 hours.

TIME NECESSARY TO STAY IN SHELTERS

Mr. STROPE. The longest times necessary in shelters in the highest fallout areas. These are quite limited regions. It is not particularly sensitive to the weapon yield, this maximum level. Again, the reason for this is that as the weapons get bigger, the clouds go to greater altitudes and the material is spread over a larger region. Very large regions for the very big explosions. Most of these regions are at fairly low levels. The times of potential exit from shelter are a matter of several days but there will always be some regions in which as much as 2 weeks will be needed.

The point was made about basing this on the time in which you could emerge from a shelter. It is necessary to look at this whole problem as a system—as an overall system of civil defense.

These people who have, in the event of an attack, either been in a fallout-free area, or a lower fallout area so that they could come out, say, in several days, are capable of performing functions and going to help those people who are in more serious fallout areas.

If you try to analyze these possibilities you find that even if a person simply stayed in shelter until somebody knocked on the door and said, "We have come to move you to another region or take care of you," that this is also the order of about 2 weeks. These numbers are not sensitive to weapon yield and they are not particularly sensitive to level of attack. This is, the regions involved in these longer stay times will grow with level of attack but in general the length of time in this pinned down period, you might call it, is not sensitive to these parameters.

Mr. YATES. Do I understand the essence of your statement to be that a 2-week period is the maximum period that you expect a person to have to remain in the shelter under any kind of attack?

Mr. STROPE. I believe that is an adequate planning assumption; yes.

Mr. ROMM. Continuous occupancy?

Mr. STROPE. Yes.

Mr. YATES. No matter how powerful the explosion is?

Mr. STROPE. Right.

Mr. PITTMAN. That is our conclusion.

HABITABILITY OF FALLOUT REGIONS

Mr. YATES. What happens to the area outside the bomb shelter while a person in the shelter remains there? Is it habitable? Can they come out and live in it?

Mr. STROPE. Do you mean in the fallout region?

Mr. YATES. Yes.

Mr. STROPE. Essentially nothing happens to it physically. It looks like a bright June day out there. Unless he has instruments, unless he has facilities in a group shelter of the type we are talking about——

Mr. YATES. I mean in the 2-week period. There is a descent of fallout, isn't there?

Mr. ROMM. It is like dust.

Mr. YATES. Is the area habitable?

Mr. STROPE. It is hazardous for some period of time.

Mr. YATES. The people come out of the fallout shelter into a hazardous area, do they not?

Mr. STROPE. As time passes, this hazard decreases and we are now describing that period of time when operations outside the shelter become feasible. This time ranges in different parts of the fallout region, from a few days after the explosion to about 2 weeks.

DURATION OF FALLOUT DANGER

Mr. OSTERTAG. At the end of 2 weeks there is no danger, is that it?

Mr. STROPE. I did not say that. I say operations outside the shelter are feasible at the end of 2 weeks.

Mr. YATES. What does the term "feasible" mean?

Mr. PITTMAN. I think what the doctor is saying is that the period——

Mr. THOMAS. The doctor is saying he doesn't know.

Mr. PITTMAN. The doctor has been choosing his words carefully and perhaps making it difficult to understand.

After the 2-week period there will be another period of, we could loosely say, 6 months—under different assumptions that would vary, of course—during which time the people will have to move with care and lead their lives with care, unless they decontaminate the areas affected by the fallout. The fallout would have some residual life, it would have some effect and the people would have to be educated in how to handle this.

FOOD PROBLEM AFTER ATTACK

Mr. YATES. What do you do for food?

Mr. PITTMAN. The food problem would become serious after a certain period of time if the food stocks in the pipeline cannot be replenished. By "serious" I mean prospects of famine.

Now, there are various plans that are under consideration to deal with this which are more in OEP's area—Office of Emergency Planning—but the availability of surplus food plays a part in this. The opportunity to bring foods in from areas that are not affected plays a part in this. There has to be some way of replenishing foods that are in the pipeline, so to speak, but there is an extraordinary amount of food in that pipeline. This includes people's iceboxes, retail stores, wholesale distribution points.

Mr. THOMAS. You will recall we have over a billion bushels of wheat and another billion bushels of corn.

Mr. YATES. But this is subject to contamination, too, is it not?

Mr. PITTMAN. Radiation itself does not contaminate. If fallout particles get into the food, they would have to be cleaned out, but most of these foods are in places protected from contact with fallout dust. All it takes is a covering. It is not like the need for large amounts of building materials to keep radiation from coming through. Any cover or partition of a wall would be sufficient to keep the fallout particles out.

Mr. THOMAS. Have not the scientists said that an ordinary tin can furnishes protection and also a big pasteboard—a regular milk container is made of pasteboard with a little wax over it.

Mr. OSTERTAG. Would the cellophane-wrapped package be protection enough for food?

Mr. STROPE. Yes.

FALLOUT PROTECTION REQUIREMENTS

Mr. YATES. Why do we then need elaborate shelters?

Mr. PITTMAN. We have been talking about the fallout particles that can contaminate. The radiation from the particles will penetrate very thick materials. In rough terms, you need about 200 pounds per square foot between a human body and the source of that radiation to interrupt enough of the rays, which are like X-rays.

Mr. YATES. Suppose a person has an ordinary home with a basement; does he need any elaborate precautions?

Mr. PITTMAN. It needs this overhead shielding material. Depending on the nature of the structure above the basement, you may have a smaller or a larger problem of creating this shielding.

Mr. YATES. Does this depend on the size of the explosion, too? I am not talking about blast, I am talking about fallout.

Mr. PITTMAN. There is a relationship, but as Dr. Strope has pointed out, the intensity of radiation may not depend on the size of the explosion but on the total weigh of several explosions near an area that can be reached by fallout. Roughly 200 or 300 miles would be the limit of the fallout pattern. If you have enough explosions, if you are near a hardened missile site and the enemy is targeting a lot of weapons on that missile site to knock it out, you could have an extraordinary intensity of radiation in the downwind area from that conglomeration of missile sites. So it is not the size of one explosion but the total level of attack on a given area that would determine the intensity of radiation.

CLOTHING AS A SHIELD TO RADIATION

Mr. THOMAS. You just told Mr. Yates there that perhaps a plastic bag would be sufficient to shield against the dust and dust particles which produce the radiation and the radiation is the bad part.

Why not wash the dust off?

Mr. PITTMAN. That is what people should be instructed to do.

Mr. THOMAS. What do you mean when you say you need 200 pounds per square inch? You are building a good case for a little gas mask and a thin plastic overall covering, aren't you? We had to have a gas mask in World War II. Why can you not come up with that now? If that will take it out of the air and you have a little plastic overall covering that will protect you against the dust. Why does this not solve our problem?

Mr. PITTMAN. If you are exposed in the first few days of fallout, the radiation from the dust within a mile or so will have destroyed enough cells in your body so that you won't live.

Mr. THOMAS. Will it be that quick?

Mr. PITTMAN. It will be that quick if there are enough fallout particles.

Mr. THOMAS. Has any research been done on that?

Mr. PITTMAN. A great deal. We think not enough on certain parts of the problem.

Mr. THOMAS. What research has been done on that?

Mr. PITTMAN. I will defer to Mr. Strope on that.

Mr. STROPE. Would you repeat the particular point you want?

Mr. THOMAS. On the quality of wearable materials that have some value against the radiation itself. We are not talking about the dust but the radiation.

We say we are going to build a structure with a particular type of roof. Furthermore, we will have some water to wash off the dust. When the dust is gone, so is the radiation, and after a few days everything is fine.

Why can you not work on that principle now in clothing, plus the gas mask?

Mr. STROPE. Mainly because the radiations in fallout, gamma radiation, is effective over great distances. For the same reason that it penetrates thick walls.

Mr. THOMAS. What research and experiments have been conducted in this field, and where?

Mr. STROPE. Do you mean characteristics of gamma rays?

Mr. PITTMAN. The effects of gamma rays on the body.

Mr. THOMAS. It doesn't make any difference which ray it is. All of them. The clothing with reference to protecting the body.

Mr. STROPE. We do not really need research to know that clothing will not protect against gamma radiation. Furthermore, the point here is if you wash off the clothing——

Mr. THOMAS. That is based on an assumption of a certain quantity of radiation, isn't it?

Mr. STROPE. I am making a flat statement.

Mr. THOMAS. Under any conditions?

Mr. STROPE. Any conditions.

Mr. THOMAS. Any quantity?

Mr. STROPE. Any quantity.

Clothing will not significantly attenuate gamma radiation.

Now, you can wash off your clothing, but most of your radiation, unless you have a shelter—the thing we are trying to get rid of is coming not from this clothing but from the ground around you, from the roof above you.

Now, unless you wash that all off to a considerable distance of a matter of——

Mr. THOMAS. We are going to be in the house and there is no dust there.

RESEARCH ON RADIATION

Mr. STROPE. I would say gamma radiation travels large distances and in a house——

Mr. THOMAS. Have there been any direct experiments along that line?

Mr. STROPE. Yes.

Mr. THOMAS. Where?

Mr. STROPE. Every weapons test since "Crossroads," and I have been in every one of these tests.

Mr. THOMAS. Where? Name them.

Mr. STROPE. Both at Nevada and Eniwetok.

Mr. THOMAS. How were they carried on?

Mr. STROPE. We have measured the radiation fields——

Mr. THOMAS. I suppose you have at Eniwetok, but how about the proving ground in Nevada?

Mr. STROPE. In Yucca Flat. We have had one surface detonation and two underground detonations.

Mr. THOMAS. These gentlemen working in laboratories would be closer to it than anybody I know of, but I do not understand about your experiments. How were they conducted? You can assume that I have been to these places two or three times. How were they conducted?

Mr. STROPE. Now, we are talking about the fact that gamma radiation penetrates great distances. This was well known before weapons tests.

Mr. THOMAS. Is that what you use now in X-ray? Which ray is that they use in X-rays?

Mr. STROPE. The X-ray is a weak gamma ray. It is the same type of radiation.

Mr. THOMAS. All right, go ahead.

MEASUREMENTS OF RADIATION DUE TO FALLOUT

Mr. STROPE. But specifically with regard to fallout, now, which is what we are discussing, measurements of radiation fields have been made at many weapons tests of the distances of radiaton effects above ground, in height and in distance, from fallout deposits. This can be related and has been related to collections of fallout. Much of this work was done by the Navy Radiological Defense Laboratory.

Mr. THOMAS. And you have materials collected at the same time, don't you?

Mr. STROPE. We have many other experiments but specifically we are describing the radiation field created by fallout and, as I say, this has been measured a number of times at weapons tests.

ANTIRADIATION WEARING APPAREL

Mr. THOMAS. Now in every laboratory, particularly small ones where you use gamma rays, they use the lead lining to some extent. Wouldn't it be possible to come up with some combination of alloys in a suit that would furnish some protection?

Mr. STROPE. The degree of protection is directly——

Mr. THOMAS. Under that question I do not assume going outside an hour and 15 minutes or 45 minutes after a big blast if you lived within 40 to 100 miles of it. He certainly has a place to work, a roof over his head and it may be complete protection but if he has a gas mask or some such arrangement it looks like you have some pretty good protection after 2 or 3 hours.

Mr. STROPE. What would you use a gas mask for, Mr. Chairman?

Mr. THOMAS. Will not that gas mask protect him against dust going into his lungs and nostrils?

Mr. STROPE. The fallout——

Mr. THOMAS. And I assume it can be washed every 30 or 40 minutes to get the dust off.

NATURE OF FALLOUT PARTICLES

Mr. STROPE. The fallout is generally in rather large particles. Most of the radioactivity is from large particles. There is really no clear requirement for gas masks. The inhalation of fallout is a relatively minor matter compared to the radiation hazard from all the surrounding particles. In general only particles in the range of 1 to 5 microns are retained in the lungs.

Mr. THOMAS. Where does the radiation come from, if it does not come from fallout?

Mr. STROPE. It comes from the radioactive fission products in these large particles. Much of the fallout is large particles which do not enter the nose and are not retained in the lungs.

Mr. THOMAS. Are they visible?

Mr. STROPE. In the significant quantities we are concerned with they are quite visible.

Mr. THOMAS. How large a piece of matter will they be?

Mr. STROPE. In the heavy fallout area, the mean particle size is about a half a millimeter, which is a good-sized piece of material.

Mr. THOMAS. What will be the density per square foot?

Mr. STROPE. This is a function of the actual level of fallout again. I can supply this for the record, but let me see if I can remember the number right at the moment. I would like to correct it if I find out I do not have it exactly right. The thickness of fallout in a region of 1,000 roentgens per hour at 1-hour radiation level will be on the order of one sixty-fourth of an inch. Perhaps a little larger.

Mr. YATES. How long will it last—indefinitely?

Mr. STROPE. You mean the dirt?

DURATION OF RADIATION PERIOD

Mr. YATES. How long will the radiation from that particle last?

Mr. STROPE. This level will decrease by a factor of 10 every 7 full passages of time, up to about roughly 6 months, beyond which it decreases more rapidly than that.

Mr. PITTMAN. It is reduced by 90 percent, at 7 hours, and by 99 percent, at 2 days, from what it was 1 hour after the explosion.

GENERATION OF RADIATION

Mr. THOMAS. What is the particle composed of?

Mr. STROPE. It is mainly silicates under conditions we are interested in.

Mr. THOMAS. How does that form? What is the chemical analysis of it? Where is it formed, is it part of the earth?

Mr. STROPE. When the detonation takes place on the ground, of course the detonation of the weapon produces the radioactivity in the fireball. This fireball, of course, being hotter than the atmosphere starts to rise very rapidly. It takes with it a large amount of material from the crater produced and other materials are swept up later. Now, at the early times the radioactivities are in a gaseous form and the material introduced early into the fireball at these temperatures is in gaseous form. The material coming in later may arrive when the fireball has cooled—since the cooling takes place as it rises—so that it never goes into a gaseous form but it may be melted. Some very late entering material may actually not even be melted.

As the fireball cools, the main process by which the contaminated material, or fallout is formed, occurs when the temperature has dropped to the point where the silicates condense from the gaseous phase to the liquid phase. The process continues as the cloud rises until all the gases have cooled as the particles fall away from the cloud.

At this point, then, those radioactive nuclides—and there are about 200 different species produced by the weapon—that have condensed

while the particles are still molten. These less volatile species are incorporated into the interior of the particles; or liquid droplets. There are very many of these particles, of course.

As the fireball further cools and more and more of the radioactive elements are condensed, and, as long as the particles remain liquid and in the fireball or cloud, they grow in size and in radioactive content.

At some point, in time, as the temperature decreases, the silicates condense into a solid particle. At this point then the more volatile radioactive elements can be acquired only by plating out on the surface of the remaining solid particles. At the same time the heavy particles are dropping out of the cloud by gravity so they are deficient in the more volatile elements. Strontium 90 is one of the elements which becomes preferentially available for the very small particles that become part of the worldwide fallout problem. But the heavy fallout for which we need shelters consists of large particles with the major gamma-emitting radioactive elements essentially locked within the particles.

Mr. THOMAS. Which deteriorates the fastest, the strontium 90 or the gamma rays?

Mr. STROPE. Do you mean half life of these?

Mr. THOMAS. Yes.

Mr. STROPE. It depends on the particular isotopes, but the mean decay of the gamma radiation is of course very fast. The half life of strontium 90, which is not a gamma emitter, is 28 years.

Mr. THOMAS. That is in the fine particles?

Mr. STROPE. Yes; that go up to the stratosphere and are brought down by rains years later.

Mr. THOMAS. That deteriorates with time?

Mr. STROPE. Yes, as does all activity.

RESEARCH ON RADIATION DETERIORATION

Mr. THOMAS. How much research have the chemists brought to bear on the further deteriorations of these very dilatory substances until they can weaken and destroy themselves and become nullified in a certain period of time? Has any experiment been carried on to further expedite that deterioration? That is the point I am raising.

I think money for research and development ought to be spent exactly there, and if you can come up with that answer you have alleviated about 99 percent of your headaches, haven't you?

Mr. STROPE. I believe that——

Mr. THOMAS. I do not see any of those projects in your justifications. They may be hidden in there because you do not spell them out, but I haven't noticed any of them.

Mr. STROPE. They are not in there because this science has progressed to the point where we know that you would be violating basic laws of nature to anticipate that result.

Mr. THOMAS. Is that an acceptable fact among all the chemists and biologists?

Mr. STROPE. I believe so.

Mr. THOMAS. And to some extent the physicists?

Mr. STROPE. I believe so.

Mr. THOMAS. That is rather strange. We have a lot of research projects in here, but I have never heard any of these scientists say that any given thing was impossible under the circumstances. If nature will destroy the effectiveness of this deleterious substance in X length of time, it looks like to me you could strengthen nature's process a little bit. So, being a nonscientist, I don't buy your theory. I do not know enough about it.

FEASIBILITY OF SHELTER PROGRAM

Mr. JONAS. Do you contemplate air vents in these shelters, vents for outside air?

Mr. PITTMAN. We contemplate circulation of air in all shelters.

Mr. JONAS. Would you comment on this. I am informed that the temperature at the center of a fire storm is above 2,000° F. and that electric cremation furnaces operate at a temperature of about 1,600° F. How many people do you think could survive at those temperatures?

Mr. PITTMAN. None.

Mr. JONAS. Obviously not.

You do not contemplate any protection for anybody within range of a blast, then?

Mr. PITTMAN. We think there would be some survival within the lethal range of blast and fire and heat. It would be spotty.

Mr. JONAS. I will read a statement by Dr. Henry T. Yost, professor of biology at Amherst College. I ask you to comment on it.

> What the shelter can do at best is to preserve the lives of a certain percentage of the population out of the blast and fire areas. It cannot reconstruct the devastated areas, reconstruct the animals and plants for food production or remove radioactivity from the soil. It is time to forget an expensive and largely futile effort to solve one of the least important problems of a nuclear attack.

Mr. PITTMAN. I would agree with the statements of fact there, but I do not agree with the conclusion. It seems to me that the most important problem in a nuclear attack is to carry as much life as you can through the first great hazard which will affect the most people, which is this intense level of radiation that has to be checked if people are to live. If you cannot do that, you cannot get to these other problems that this gentleman is referring to.

There are, it seems to us, answers to these other problems but not fallout shelters——

Mr. JONAS. Have you read this pamphlet "A National Shelter Program," prepared by a group of independent specialists, most of whom are professors at Columbia University? They are civil engineers and architects and so forth.

Mr. PITTMAN. I am familiar with it and I think it is appropriate to say on the record that there is a great deal of opinion outside the Government from people in the same professions that would be in conflict with the conclusions of that group. There is an article in this last issue of the Science magazine which comments on this article, which might be of interest to you. We would be glad to provide it for the record.

Mr. JONAS. And we would be glad to receive it.

(The document referred to follows:)

[From the Mar. 9, 1962, issue of Science, the organ of the American Association for the Advancement of Science]

News and Comment

THE CIVIL DEFENSE DEBATE: NEITHER SIDE IS TALKING THE OTHER'S LANGUAGE

As noted here last week, the debate in Congress over the administration's civil defense program is shaping up as primarily one over whether the program will be worth the money that will be spent on it; this congressional debate is not likely to be very pertinent to the debate going on outside of Congress, particularly in scientific and academic circles, which is chiefly concerned with whether the whole idea of an extensive civil defense program is well-advised to begin with. The administration's position, at heart, is a simple one; there exists an undefinable but undeniable possibility now and for the foreseeable future that we might be subjected to a nuclear attack; therefore it would be prudent to take some precautionary measures. The opposing case, at heart, is almost equally simple; that a nuclear attack, on almost any scale, with or without civil defense, would be such an indescribable disaster that it would be folly to adopt a policy which might mildly mitigate the disaster if the price of adopting the policy is to make the disaster itself more likely to occur. A case can be made, on various grounds, that a civil defense program would increase the chance of the disaster; therefore, depending on how firmly one believes he has made this case, it would be at least questionable, and at most, outright folly, to adopt a civil defense program.

The administration position can be attacked directly, on the grounds that it is just not worth the money it would cost. This is the heart of the debate in Congress, but is not particularly pertinent to the debate discussed here. The opponents here are not directly concerned with wasted money.

Their statements usually discuss the extent of a nuclear disaster even with shelters, but rarely as the basis for calculations of relative utility. Their point is not so much to attack the administration's view that there are some significantly useful things that can be done now that will be valuable in the event of an attack, but to establish firmly their own basic premise on the immensity of the disaster with or without civil defense.

For some, and in fact for a great many people, the argument really ends right here with a statement of the extent of a nuclear disaster. Herman Kahn made the point before the Holifield committee that while someone could reasonably say "I prefer to be dead than Red," no one could reasonably argue that he preferred everybody to be dead than Red. If the choice came down to "everybody Red or everybody dead," the choice had to be "everybody Red." The choice does not have to be made anything like this unambiguous to convince someone that there is more danger involved in failing to work effectively to prevent war than in failing to prepare (with what very limited effectiveness it is possible to prepare) against the possibility that war will take place. So one can take a position against civil defense and fallout shelters, not as particularly evil things in themselves, but as a convenient symbol of the arms race.

This seems to be the commonest reaction, but does not even necessarily imply that the protester is particularly opposed to civil defense. The important thing, in these terms, is not so much to defeat the administration program, but to protest against it. In the extreme case, you could even privately feel that on balance the program is well-advised, and still be perfectly consistent in joining the protest—on the grounds that the danger of damaging or destroying the program is heavily outweighed by the gain, through the protest, of impressing on the public the extent of the danger we are in. In this view, you might feel that it would be preferable to see the administration get its program through Congress after a great debate that served to awaken the public to the dangers of the arms race, than to see the program quietly smothered in Congress without a great debate. This position, essentially one of general protest against the arms race, seems the strongest of those that have been taken. Indeed, unless one is willing to discount everything the President has been saying about the arms race as insincere, the President would have great cause for concern if such a protest failed to develop. His own actions have not been particularly directed at discouraging it—the gesture, for example, of sending out coffee to the peace marchers in front of the White House, or his blunt remark at a press conference last month that in the event of a nuclear war there would be no winners.

But beyond this generalized protest, when the opponents attempt to build a formal case against the specific program of fallout shelters, as opposed to a generalized case against the arms race which happens to pick the shelter program as a symbolic target, the case appears to become weaker to the extent that it centers on fallout shelters as a separate subject for opposition.

There is nothing mysterious about this progressive weakening. The general protest position depends only on some simple and widely accepted points: that the arms race itself is at least as much of a problem as communism; that we have not made much progress in restricting the race; that even if we had an opportunity to make progress, it would be made difficult, perhaps impossible, unless there were general acceptance of the view that the race itself is an enemy; and that a single-minded policy concentrating solely on containing or reducing the Communist threat is likely to lead to disaster. All this leads readily to the conclusion that it is extremely important to bring home to the public the nature and extent of the dangers of the arms race. The more specific position, singling out civil defense as a particularly undesirable policy, depends on the hypothetical possibility that civil defense will increase the chance of war. No one can prove this, of course, and there are good arguments that the program would be more likely to lessen the chance of war. Just as a case for fallout shelters would become progressively weaker the more it tended to concentrate on a hypothesis that the shelters would somehow reduce the likelihood of war, the case against shelters becomes weaker as it tends to concentrate on the opposite hypothesis.

A case for shelters decreasing the chance of war, for example, could be based partly on the argument that the program will force the public to face the possibility and meaning of a nuclear war, and therefore to accept the view that the risks involved in arms-control agreements might be preferable to the risks of an uncontrolled arms race ("I am told that nobody wants to read about the hydrogen bomb, or even think about it," Elmer Davis wrote 7 years ago, "but it will be there whether we think about it or not, and perhaps especially if we do not."). Partly the case could be based on the argument that the more fully the Russians believe that we are thinking realistically about the possibility of nuclear war, the less likely they are to push us into a position where using nuclear weapons seems the only alternative to a humiliating defeat.

The case that can be made with such arguments is by no means a compelling one, but it is hard to see where it is a noticeably weaker case than the contrary one that civil defense will increase the chance of war, particularly if civil defense is attacked as something uniquely unsound, as opposed to an attack which happens to single out civil defense, but which is really an attack on the deterrence policy generally.

Much the same points which are effective in arguing that civil defense would increase the chance of war—those centering on the idea that the increase in the credibility of our deterrent makes it more likely that we would actually fight—seem to apply at least as well to a number of other policies which increase that credibility: for example, the buildup of conventional forces, the buildup of an elaborate control and command system for fighting a "controlled" nuclear war, as opposed to a suicidal, and hence unlikely, massive attack. One can argue that it is unlikely that a limited war between the great powers could be kept limited, and therefore that these steps, which clearly increase the chance of our fighting in the event of a major crisis, increase the chance we will fight an allout war.

Then again, though, it might not: for the increase in credibility reduces the likelihood that we would be pushed into the position of having to make the choice. So, in general, if one thinks of war as the overwhelming danger—to the extent that opposing the Communists seems unimportant by comparison, then it is far from clear in many cases whether whatever we do within the framework of a deterrence policy would decrease the chance of disaster, and it may seem logical to turn to unilateral disarmament.

A somewhat related position is that of the person who does not reject the policy of deterrence, but feels that the administration is already too aggressive, or might become too aggressive—attempting to deter Russian moves which are really not important enough to take any risk to deter, or in the extreme case, attempting to use a nuclear threat to force the Russians to give way on what they regard as their vital interests. Whether one takes this position depends mainly on how much confidence one has in the judgment of the administration, particularly of the President. An easy test on this point is available to readers who are not strongly opposed to the civil defense program, but who were

strongly opposed to Nixon during the election. Would your feelings about the civil defense program be any different if it had been proposed by President Nixon instead of President Kennedy?

An impressive example of a critique that includes touches of the positions outlined so far is Gerard Piel's Commonwealth Club speech, which is reprinted in the February issue of the Bulletin of the Atomic Scientists. In contrast to Piel, several recent attempts to build a narrow case against civil defense seem quite weak—and the weakness seems to be accentuated when the case is presented in a format which suggests that authors are not speaking as partisans in a public debate, but are merely reporting the objective judgments of science.

A group of scientists, mainly from Columbia University, for example, have put together a series of papers relating to civil defense (available from box 577, New York, N.Y.) which is being used in presentations to Congressmen and their assistants. Some of the papers relate to the immense costs of a deep shelter program, which no one in a position of responsibility has proposed. (Even Congressman Holifield has been pushing only for fallout shelters augmented by a modest amount of blast protection, a program that differs in cost by an order of magnitude from a deep shelter program.) Others describe the immensity of a nuclear disaster, which one can accept and still favor fallout shelters. The final paper, by Otto Klineberg, summarizes in 800 words 3 quite different arguments against shelters on psychological and strategic grounds, and in this limited space does not, unsurprisingly, build a serious case for any of them. It is hard to see how the paper could make much of an impression on anyone who had not already convinced himself that shelters are undesirable.

The problem of possibly confusing a general readership about whether it is getting an objective scientific statement or a partisan statement that happens to be made by scientists comes up even more strongly in a report called "The Shelter Centered Society" (Peace Research Institute, 1329 18th Street NW., Washington, D.C., 35 cents). The report presents numerous possible objections on sociological grounds to the civil defense program, usually in the form of questions or suggestions of things that "might" happen. The report offers virtually no evidence and rarely even a detailed argument to suggest that they would happen, or how likely they are to happen, although a good many of the possibilities seem rather unlikely ("might there be sizable emigrations from North America?"). In particular, the report strongly suggests that a policy of civil defense is incompatible with seeking disarmament. The only explanation is the suggestion that "almost all the people" would lose interest in pursuing negotiations because they would believe that "negotiations have failed and war is looming." If this is true, "almost all the people" must be about as rational as a man who sees lifeboats on a ship and concludes that the ship is about to sink.

DIFFERENCE IN THOUGHT ON EFFECTIVENESS OF SHELTER PROGRAMS

Mr. YATES. What is the burden of the answer?

Mr. PITTMAN. Dr. Strope, will you describe the contents of that article?

Mr. STROPE. In the Science article?

Mr. PITTMAN. Yes.

Mr. STROPE. The statement is made that in attempting to show that a national shelter program is out of reach, the group concentrates on a very deep shelter program that nobody has proposed and that it makes a very weak technical case for its position.

Mr. JONAS. Who prepared the article?

Mr. STROPE. The editors of Science.

Mr. JONAS. Who are they?

Mr. STROPE. This is the organ of the American Association for the Advancement of Science. The AAAS.

Mr. THOMAS. Well, gentlemen, isn't this true—I know of 15 or 20 articles, well written, very interesting, prepared by Ph. D.'s, doctors, physicists, biologists, and chemists. You can get any opinion you want from them. One group will say "Yes." This group will take

almost the identical same facts and vary them a little bit and say "No." The upshot of it is, as far as we can tell, that there is no complete unanimity of thought among the scientific community on the effectiveness of this remedy or that remedy, or what have you.

Is that a fair statement? I am sure that your staff has read all of these publications. You get a different one every other day; do you not?

Mr. PITTMAN. There is much more unanimity of thought than appears on the surface. What is happening here is that the scientists and other experts are taking a common body of knowledge—there is a common base of knowledge that underlies this subject—and they are using it for different purposes. They are taking information out of context in order to arrive at certain conclusions. I think a great deal of this debate through articles on this subject is fanned by people talking about different things and appearing to be talking about the same thing.

USE AND MEMBERSHIP OF THE NATIONAL ACADEMY OF SCIENCE CIVIL DEFENSE COMMITTEE

We believe there is no question that there is a common body of scientific assumptions which support the conclusions we have reached.

We went to great pains to verify this fact.

We relied upon the National Academy of Sciences Committee on Civil Defense, in part, and we have drawn on other authorities that we felt were representative of the best scientific opinion.

Mr. THOMAS. Who is on the committee over at the National Academy on Civil Defense?

Mr. PITTMAN. Dr. Taylor is the chairman.

Mr. THOMAS. Where is Dr. Taylor from?

Mr. PITTMAN. Dr. Taylor is from the Bureau of Standards and also the Chairman of the International Committee for Radiation Protection.

Mr. THOMAS. Who else?

Mr. STROPE. Mr. Gerhard D. Bleichen, John Hancock Mutual Life Insurance Co.;

Dr. Victor P. Bond, Brookhaven National Laboratory;

Dr. James O. Buchanan, Office of Emergency Planning;

Mr. Jack C. Greene, Office of Emergency Planning;

Dr. Harold Knapp, Atomic Energy Commission;

Dr. George V. LeRoy, University of Chicago;

Mr. Richard Park, National Academy of Sciences;

Mr. William Perreault, American Institute of Architects;

Dr. John W. Raker, Massachusetts General Hospital;

Dr. John H. Rust, University of Chicago;

Dr. Lewis V. Spender, National Bureau of Standards;

Dr. Lauriston S. Taylor, National Bureau of Standards;

Dr. Paul C. Tompkins, Atomic Energy Commission;

Dr. Jack A. Vernon, Princeton University;

Dr. Merit P. White, University of Massachusetts;

Dr. Stephen B. Withey, University of Michigan.

Mr. Richard W. Johnston, Atomic Energy Commission.

Mr. THOMAS. Do you have any Nobel Prize winners in there in the field of chemistry, or biology?

Mr. STROPE. That I do not know.

Mr. PITTMAN. We can provide for the record a list of the Nobel Prize winners that have expressed the point of view we think underlies the scientific assumptions of this program. The names of Dr. Teller and Dr. Libby come to mind.

DEVELOPMENT OF "FALLOUT SUIT"

Mr. EVINS. I see no reason why you should not entertain the suggestion of the chairman. We developed the space suit for Shepard and Glenn against heat and cold. Why can we not develop something for protection of the body rather than bury us all in the ground?

I do not think you ought to close your mind to the idea.

Mr. PITTMAN. I think you are right. If any such solution could be found, it would have world-shaking significance to both military and civilian life. I think the reason why Dr. Strope says we are not now actively pursuing it is because in the early stages of research it was discounted.

If there is any hint that this possibility exists, you can be sure a great deal of the resources of any of these agencies would be immediately applied to it. We have to have such a hint that this may provide some return.

Mr. EVINS. Do you take your ideas from only one source?

Mr. PITTMAN. I do not think that is true.

I think a good deal of the research is being conducted not just by our organization, but by independent agencies that have very broad missions and who are seeking solutions to a wide range of related problems.

Any opportunity to deteriorate radiation, radioactive material more rapidly, would be of tremendous significance. I would suppose there is a wide range of research projects that are in existence that would bring this opportunity to light if it were real. We will take the suggestion seriously and examine the research projects that exist to see if there is anything more that can be done about it.

Mr. YATES. Is there a unanimity of opinion as to the value of your fallout shelter program on the same set of facts by scientists having the same technical competence?

OPINIONS ON EFFECTIVENESS OF FALLOUT SHELTERS

Mr. PITTMAN. There is unanimity of opinion on the matters we have discussed here, which is the effects of radiation on materials and the human body in general.

There is not unanimity on the efficiency of fallout shelters. There are those who say different weapons effects are more important—blast, heat, and so forth.

This kind of difference of opinion is very prevalent.

On the basic assumptions as to the behavior of radiation, there is no difference of opinion.

Mr. YATES. Is there unanimity of opinion on the value of fallout shelters in resisting radiation?

Mr. PITTMAN. I would say yes. We are not discussing different ideas of how to build fallout shelters.

There is unanimity of opinion that a mass of material is necessary to interrupt the gamma rays. There is no other way to accomplish this: lead, so many inches, and concrete, so many inches. The formula is determined by weight per square foot, and there is unanimity of opinion on that.

LIFE OF GAMMA RAY

Mr. YATES. You have indicated for the record the extent of life of the gamma ray, and you said the harmful effects died fairly quickly; is that correct?

Mr. PITTMAN. That is correct—the most harmful effects.

Mr. YATES. What is the life of a gamma ray?

Mr. PITTMAN. It is a declining curve. It drops fairly sharply in its early life and tends to level off. That is why we made the assumption after 2 weeks people can emerge from shelters, but they will have to be careful for perhaps 6 months.

Mr. YATES. When you say "careful," what will they have to do?

Mr. PITTMAN. Unless there is decontamination——

Mr. EVINS. Do not play in the sand?

Mr. PITTMAN. That is right.

Unless you are able to decontaminate surrounding outside surfaces, and there are ways of doing this, you would limit the movement of people, particularly those whom you know had already absorbed a certain amount of radiation, the effects of which stay with them. Particularly younger people are likely to be more seriously injured than older people. Their bones are growing.

Mr. YATES. The effect of the gamma ray lasts for 6 months; is that correct, in a diminished potency?

Mr. PITTMAN. I used 6 months to give you a general idea.

Mr. YATES. Does it last longer?

Mr. PITTMAN. It could last longer, or less.

Mr. YATES. That is what you consider to be average?

Mr. PITTMAN. A reasonable figure to be used for this purpose.

Mr. YATES. Does it still have a potency at the end of 6 months, or is it extinguished?

Mr. PITTMAN. It is extinguished for practical purposes.

HAZARD OF STRONTIUM 90

Mr. YATES. How long does strontium 90 last?

Mr. PITTMAN. Decades. Long enough so that there is no cure for the problem of strontium 90, if in enough volume, except to get rid of it.

Mr. YATES. How much strontium 90 is there in a 30-megaton explosion?

Mr. PITTMAN. Comparatively little. It is a much smaller hazard than gamma radiation.

Mr. YATES. Is it an immediate hazard?

Mr. PITTMAN. A good deal of it will be in the upper atmosphere circling the globe several times. This is the delayed fallout you

read about in connection with weapons tests. Some of it would be in the local fallout that you would be concerned with in a nuclear attack. The amount of it would be small enough so that it would not compete with the gamma rays as a hazard to life in the first 6 months. If it happened today, in peacetime, if that amount of strontium 90 were in our fields, people would be very concerned about it. But compared to the catastrophe that had just taken place, people would not be concerned about it after a nuclear attack.

ATTACK ASSUMPTIONS

Mr. YATES. What is the presumption you go on in terms of the extent of the attack?

How many missiles do you contemplate will be fired on our country in terms of your assumption, fired and exploded?

How many explosions will occur in terms of your preparation?

Mr. PITTMAN. For our planning purposes, we generally measure the attack in total megatons delivered on the country, disregarding whether it comes in the package of a 1-megaton weapon or a 20-megaton weapon. The effects of these weapons vary somewhat with different packaging, but it does not change the extent of destruction radically.

We assume hypothetical levels of 2,000, 5,000, 8,000, even 10,000 megatons delivered on the United States and work back from that to levels of radiation that might have nationwide significance.

Mr. YATES. What is the maximum of megatons that you would use in your assumption?

Mr. PITTMAN. Well, the chart that you saw had a column over on the right. Were you here at the time?

That assumed 20,000 megatons delivered. We feel that is an unrealistic projection. It is included to make a theoretical point.

(Discussion off the record.)

Actually, that chart is the most optimistic of the charts. It shows most of the population saved by fallout shelters. The assumption is that they are attacking military targets primarily.

ATTACK ASSUMPTIONS

The main significance of these studies we have made is that blue band of lives saved by fallout shelters staying fairly constant with rising levels of attack under the different categories of attacks. In other words, the lifesaving capability of the fallout shelter system is not reduced with the rising level of attack. The change takes place in the yellow and green bands.

You have more fatalities from the immediate explosion effects, most of which could not be avoided by any type of shelter, and you have less survival with or without shelters.

Mr. YATES. I have difficulty in associating to this. I am wondering about the world these people will come into.

What I would like to do is to come to an agreement with you as to what a reasonable number of the megatons to fall on this country would be. Is 20,000 reasonable?

Mr. PITTMAN. That would far exceed any reasonable estimates.

Mr. YATES. What would be a reasonable number as to what you anticipate would fall on the country in a sudden attack?

Mr. PITTMAN. I can give you figures but they are classified.

Mr. YATES. If it is classified, I do not want it for the record.

Mr. PITTMAN. We will give it to you, but not on the record.

Mr. YATES. I want to discuss this matter with you on the record.

Mr. PITTMAN. Yes.

Mr. YATES. What I want to do is to take a figure that is not classified if we can for the purposes of an assumption in order to relate my subsequent questions to a possible attack.

Mr. PITTMAN. Let's take a hypothetical 6,000 megatons.

Mr. THOMAS. Everyone in this room has been cleared for security with the Atomic Energy Commission. I assume your people have.

Mr. YATES. Off the record.

(Off the record.)

Mr. YATES. Let's not engage in classified material. Let's take an assumption as to what a probable attack would be, a hypothetical attack.

You suggest a figure of 6,000 megatons?

Mr. PITTMAN. Yes, but as a hypothetical, not a probable figure.

Mr. YATES. Covering the whole country?

Mr. PITTMAN. Yes.

Mr. YATES. And how much gamma rays are generated, or strontium 90 is generated?

NUMBER OF LIVES SAVED BY FALLOUT SHELTERS

Will there be 50 million people saved by your calculation from this kind of attack?

Mr. PITTMAN. We estimated that, under the least favorable assumptions as to the purpose of the enemy attack, there would be 40 to 55 million saved.

Mr. YATES. By the fallout shelter program?

Mr. PITTMAN. Yes, that otherwise would have been killed.

Mr. YATES. How many people would be killed without the fallout shelter program?

Mr. PITTMAN. Let us assume a situation in which the people that would have been killed, whether or not you have a fallout shelter system, are a little above 50 percent, using a hypothetical attack level.

Mr. YATES. That is 90 million?

Mr. PITTMAN. Yes.

Mr. YATES. Is this by direct blast, or all cases, fire storms and all?

Mr. PITTMAN. Fire storms would be included.

Mr. YATES. And the fallout would be included?

We are talking about a condition if we did not have your shelter program in being?

Mr. PITTMAN. Following my assumptions, there could be about 85 percent fatalities without shelters.

CONDITIONS AFTER ATTACK

Mr. YATES. Will the remaining 15 percent survive in a country that has been subject of this kind of an attack?

Mr. PITTMAN. I think it is uncertain whether 15 percent of the people could piece things together and recover, at least as a nation.

Mr. THOMAS. What are they going to eat?

Mr. PITTMAN. I think it is likely there would be some evacuation from the country under those conditions.

Mr. YATES. We are really on the beach if this happens. It will happen pretty much all over the world.

Mr. PITTMAN. Except the "on the beach" concept which people have on their minds is one of permanent destruction. In fact, the devastated areas could be reoccupied.

Mr. YATES. How?

Mr. PITTMAN. Because most of the radiation effects die out, not all but most.

Mr. YATES. In 6 months?

Mr. PITTMAN. I have used that figure.

Mr. YATES. You think it could be reoccupied in 6 months?

Mr. PITTMAN. Yes.

NATURE OF FALLOUT

It may be that the strontium 90 and some of the longer-lived isotopes, which would tend to be concentrated in certain areas, would contaminate those areas. However, we do not as yet have any good estimate of what the situation with respect to these isotopes might be.

Mr. YATES. Concentrate in certain areas. I thought this is carried by the wind.

Mr. PITTMAN. My understanding is the heavier of the strontium 90 part would be different from the rest of the fallout. There would be a streaky deposit of strontium 90.

Mr. STROPE. It would be largely in the worldwide fallout. It would be distributed primarily over the temperate latitudes of the Northern Hemisphere, around the globe.

Mr. YATES. South of the Arctic Circle?

Mr. STROPE. Yes. We are talking now about a 6,000 megaton attack, our hypothetical attack.

Mr. PITTMAN. Some of the strontium 90 will be in the local fallout. The rest will rise and go around the world descending in a spotty fashion. The portion in the local fallout, I believe, is what you are asking about.

Mr. YATES. No. My question was prompted by the fact you said the strontium 90 would come down in streaks. I was under the impression it came down in a gentle fall.

Mr. PITTMAN. You mean the delayed fallout?

Mr. YATES. Yes; and does not come down in streaks. I asked you whether that was correct, and you turned to Mr. Strope.

Mr. PITTMAN. There are two questions: deposit through the local fallout and deposit through the delayed fallout.

EFFECTS OF STRONTIUM 90

Mr. YATES. Perhaps the question really is, is it possible in view of the fact strontium 90 is the factor you have to contend with, can your remaining 15 percent survive? Can you rebuild any sort of a country?

Mr. STROPE. Strontium 90 is not a gamma emitter. It is hazardous only when taken in the body. It is a bone seeker. Its result is not to kill people, but to increase the incidence of leukemia.

Mr. THOMAS. Just cancer?

Mr. STROPE. The strontium 90 from that attack would not be of such a level as to introduce a question of whether these survivors could continue to survive or not.

Mr. YATES. It would not bear on the problem. What about the question of food and water?

Mr. STROPE. The level of strontium 90 involved, even if you did nothing about it, still would not yield a question as to the survivability here.

Mr. PITTMAN. Are you asking about food and water independently of strontium 90?

Mr. YATES. We are in this hypothetical example, and we have 15 percent of the people trying to live. I wondered about the strontium 90 as being a factor, and Mr. Strope says it is not.

Mr. STROPE. Not in the survivability of these people under this hypothetical attack.

Mr. YATES. I would assume from your answer, strontium 90 is never a factor of survival in an attack.

Mr. STROPE. Not in an attack; no.

Mr. YATES. Off the record.

(Off the record.)

AVAILABILITY OF FOOD AFTER ATTACK

Mr. YATES. How would the remaining 15 percent get their food.

Mr. STROPE. First of all, they would have rather vast surviving stocks of food.

Mr. YATES. Not affected by the attack?

Mr. STROPE. Right.

Mr. YATES. Such as what?

Mr. STROPE. You would have, of course, the most obvious thing, the large surplus of foods that are stored in this country largely outside the attack areas.

Mr. YATES. Such as what? Give us examples of what you have in mind?

Mr. PITTMAN. Wheat.

Mr. YATES. In the granaries?

Mr. PITTMAN. Yes.

Mr. ROMM. All the canned food.

Mr. STROPE. Furthermore, they can start growing crops.

Mr. YATES. There is no pollution of the soil?

Mr. STROPE. It is not significant to survival.

Mr. PITTMAN. But it might affect health.

GENETIC ASPECTS OF ATTACK

Mr. YATES. What kind of survival are we talking about?

Mr. STROPE. I think it is important to get it in the record in terms of quantity.

Mr. YATES. You are talking about a minimal survival. You do not know how long that person is going to last, and under what conditions. Is this a survival that will permit another generation to come along?

Mr. STROPE. Yes. Strontium 90 is not a genetic problem.

Mr. YATES. Is Dr. Pauling wrong with regard to the mutations that will develop?

Mr. STROPE. He says it does not come from strontium 90.

Mr. YATES. What does it come from?

Mr. STROPE. He says it comes from the gamma radiation associated with fallout, the species that are gamma emitters. Strontium 90 is a bone seeker, and the reproductive cells are not in the bones.

SURVIVAL AFTER ATTACK

Mr. YATES. We have discussed the situation where you have had no bomb shelters. Now you propose we have a system of bomb shelters, and on that basis the casualties of this hypothetical attack fall by how much?

Mr. PITTMAN. Over 30 percent, because of fallout shelters.

Mr. YATES. What happens to the survivors? They come out of the shelters. Are they like the other 15 percent we discussed previously? They come out in this world and try to reestablish themselves?

Mr. PITTMAN. The difference is there are many more of them, so there are more opportunities for organized community effort to put life back together.

Mr. YATES. What is the difference in numbers?

Mr. PITTMAN. Taking my hypothesis, I would use for this discussion sixty million with shelters, and 30 million without a shelter system.

Mr. YATES. The world in which your shelter people come out into is the same type of world, is it not?

Mr. PITTMAN. It would be the same type of world.

Mr. YATES. How do they survive?

How do they get food? How do they get water? How do they take care of themselves?

Mr. Romm indicated we have canned food and Mr. Strope indicated we could start growing things. He did not indicate whether or not they could continue to survive after having grown these things, did he?

Yes, he indicated they could survive, but he did not indicate what form the survival would take.

Mr. STROPE. We were discussing strontium 90 at the time.

Mr. YATES. Which is still a factor, is it not, in terms of the world these people come out in?

Mr. STROPE. Well, my point here is, the attack level we are assuming as a basis for this discussion is approximately 40 times the megatonnage that has been detonated in all weapons tests, not counting the last Russian series.

EFFECTS OF STRONTIUM 90 ON SURVIVORS

There is test evidence, which is quite extensive. Both the AEC and the Department of Defense have made major efforts in this area.

The conclusion I would draw is that the effects of strontium 90 from that attack would not be noticeable against the background of other postattack health problems.

Mr. THOMAS. Mr. Yates has posed this question to you. Suppose you dropped in this country 30 or 40 medium-sized bombs. The fallout of strontium 90 will not be too serious?

Mr. STROPE. I can make it stronger than that.

Mr. YATES. I am trying to find out what the probabilities of survival are, and what a survival world is like.

What are the people like? You say strontium 90 is not a factor.

Mr. STROPE. Let me take some numbers out of the effects of nuclear weapons which will bear on it.

Mr. YATES. What I want is, What is the world in which they live like?

What are the people like?

You say these people go through the canned food and they start planting crops, and they go through their stored food and they have to survive. What are they going to do in terms of water and in terms of food and what will the people be like?

Will they be subject to any diseases, to the cancers that strontium 90 produces, subject to any gamma ray changes?

Mr. STROPE. Speaking now of the strontium 90 problem for this attack, the level of strontium 90 that would be incorporated in the bones of the people would not, in my opinion, be sufficient to cause any widespread noticeable effects.

Mr. YATES. Where are we in terms of this statement of yours?

Are we talking about the people who have emerged from the shelters?

Mr. STROPE. We are talking about any survivors in terms of the strontium 90. People will not begin to assimilate strontium 90 until they are out of shelter and begin eating foods that have been newly grown on contaminated areas. Thus it would be a matter of some years before the immediate survivors would build up body burdens of strontium 90 or other long-lived nuclides. Soil fixation, crop rotation, and special food processing could be worked out before very long to reduce or stop this process. The strontium 90, at least, is not an immediate problem of hazard to one emerging from shelter. It could build up slowly over a period of years.

POTABILITY OF WATER

Mr. YATES. The attack has occurred. The people are emerging from their fallout shelters. They have consumed their food and such water as is potable.

Mr. STROPE. Let's say it is all potable after several weeks.

Mr. YATES. It is all potable?

All the water supplies are potable? You can use any water?

Mr. STROPE. Insofar as radioactivity is concerned, yes.

Mr. YATES. And strontium 90?

Mr. STROPE. Right.

Mr. YATES. Are there any other enemies of mankind that are likely to be in the drinking water?

Mr. JONAS. It depends on where the bomb hits. There might not be any water system left.

Mr. YATES. You have your lakes and rivers. You say the gamma rays and strontium 90 will not be factors in the consumption of water. How about something else?

Mr. STROPE. There are other long-lived isotopes, but their hazard levels are expected to be less than strontium 90.

Mr. YATES. It is not a factor either, is that what you are saying?

Mr. STROPE. Yes. I am saying that the consumption of the available food and water is not a factor in the survival of these people.

Mr. YATES. What is the level of survival now that we are talking about, just actual movement?

EXISTENCE AFTER ATTACK

Are these people going to be subject to diseases? Are they going to survive with cancer?

Mr. STROPE. Let me restate it.

The National Committee on Radiation Protection, and the International Commission on Radiological Protection have said that it would require a body content of at least 10 microcuries of strontium 90 per gram of calcium to cause a noticeable increase in the occurrence of bone cancer, which is what we are talking about.

And calculations show that, in the event of a nuclear war, bomb debris from many thousands of megatons of fission would have to be added to the atmosphere before the worldwide fallout of these weapons would lead to a concentration of 1 microcurie. Some several tens of thousands of megatons would cause a noticeable increase.

Mr. YATES. Let me see if I can put it in terms I can understand.

You have been one of those who have been in the bomb shelter, and you emerge after 2 weeks into this hypothetically attacked world. Can you survive as you are now without any incidence of disease, or without any potential disease which might have been caused by this catastrophe?

Mr. STROPE. What we are saying is——

Mr. YATES. I am asking you a question. Do not try to take me in the back door. Do not give me any numbers. You are a person coming out out of the bomb shelter into this devastated land.

Now, you have certain food and water available. You can eat the canned food. I do not know about the water. You say it is going to have strontium 90 but not enough to hurt. It is going to have the other chemical compound, and it is not going to be bad enough to hurt. The gamma rays will not hurt you, so you can go right out and dip your cup in the water and drink it.

Mr. STROPE. I will say this——

Mr. YATES. Is the answer to my question yes?

Mr. STROPE. The answer is yes.

It will not change my probability of getting bone cancer later in life.

Mr. YATES. Will it change your possibilities of getting any other catastrophic diseases, or having any effect on our next generation?

Mr. STROPE. No. None of these effects are known to be caused by strontium 90.

Mr. YATES. Will people go on with normal life?

Mr. STROPE. It won't be like it was before, especially with regard to the gamma radiation from the fallout, you must pursue a well-defined cautious program which we have studied and worked out over a

period of years in order to avoid an accumulation of whole body gamma ray radiation.

Mr. YATES. What will you have to do to go back to your books and study in order to survive in that world?

Mr. STROPE. I think the numbers Secretary Pittman has given are good average numbers, that for the first 6 months at least I would be quite circumscribed in my activities.

Mr. YATES. What will you have to do?

RECLAMATION AND DECONTAMINATION

Mr. STROPE. The most effective and reasonable plan will be, as a part of a community I will engage, or in some way support, the reclamation and decontamination of the regions we need to live in outside the shelters.

Mr. YATES. How will you do this?

Mr. STROPE. This is a process of removing the fallout material, the dirt, and the placement of it where it will not affect us. This is either covering it up; in paved areas, flushing it into the storm sewers system. We will use fire hoses on paved areas and buildings and roofs.

Mr. YATES. You are going to have pumping stations available for this?

Mr. STROPE. In some areas. In the fallout areas these will be available. In certain areas, we will have to repair these before we undertake this process.

Mr. PITTMAN. One of the main things you would do after coming out of shelters, until you knew what the situation was, how much radiation you have absorbed and what the levels are, would be to sleep in a part of your house that is the best protected part of it. If you have a basement, you might move your bed down there and spend some weeks sleeping in the basement until reliable information reached you as to the exact levels of residual radiation in your area and estimates of average exposure in your neighborhood.

The decontamination simply shortens the time during which your outdoor movement is restricted.

PRECAUTIONS AGAINST EXPOSURE TO RADIATION

When you first come out of these shelters, you would take some precautions against exposing yourself unnecessarily to continuing residual radiation.

Mr. YATES. How do you know where to walk? Do you need special types of clothing? Do you need special shoes?

Mr. STROPE. For ordinary purposes, no. But you need radiation instruments and people who know how to use them in order to determine what the hazards are.

Mr. JONAS. I do not see how you can answer those questions categorically. Do your answers not depend at all on the dosage of radiation that one is subjected to?

You have told Congressman Yates when you walk out of a shelter at the end of 2 weeks you could expect a normal life. Now, that is contrary to some information I have. Does your answer not have to be qualified by saying it depends upon the dosage?

Mr. STROPE. What I am saying is that for this hypothetical attack, that by 2 weeks you can expect to come out of the shelters and by pursuing an organized effective program, including decontamination, you can survive and recuperate.

Mr. JONAS. Even if a 50-megaton bomb had been dropped within 5 miles of the shelter?

Mr. STROPE. The yield of a single weapon is not a significant measure of the recuperative capability. In an adequate shelter outside the blast-heat radius, the answer is "Yes; you can come out in 2 weeks."

Mr. PITTMAN. I think this should be made clearer, Mr. Congressman, I fully agree with you that a normal life would not follow. If people for one reason or the other, whether because of the yield of weapon or because they did not get into the shelter on time, or because the shielding in the shelter was inadequate, or because they had to make premature trips out of the shelter to bring provisions in, or for any of a number of reasons, some people may have absorbed dangerous dosages of radiation.

It is our plan that people be equipped in large group shelters with dosimeters and rate meters and they use them, if they go out of the shelters, so they would know how much they had absorbed. There is not going to be any perfect planning. There will be people who will not know how much they have absorbed. They can only guess at it.

If their guess is that they have absorbed quite a little, they will be more restricted in their movements than other people, and they will stay in the shelters as much as possible until the uncertainties have cleared up.

HEALTH HAZARDS OTHER THAN RADIATION

Mr. JONAS. A professor of biology says the explosion of 200 roentgens will cut from 1,000 to 2,000 days from the average lifespan. Do you agree with that?

Mr. STROPE. I do not agree with that.

Mr. YATES. Suppose you come out of the shelter, Mr. Pittman. What do you do?

Mr. PITTMAN. We should look at this from our position here, in terms of the national picture, covering large areas and the proportion of lives that might be saved. I think there is no question if this country is as badly hurt as it would be under this level of attack, there would be all sorts of hazards to health. I do not know whether strontium 90 would be classified as a hazard to health or not.

There may be much more serious hazards to health because people have been crowded in these shelters and they will pick up bugs they would not otherwise have. I would expect serious health problems and some people will die from disease.

That would add fatalities beyond the deaths that would result from radiation.

It is our judgment from what is now known, and there is a large area of the unknown, that the deaths from these incidental later causes would not run into the millions as would the deaths from radiation. If we can save people from the initial impact of the very high levels of radiation, and educate people in what to do, and if there has been an effective medical training program—and this, the medical self-help program we are now testing will help a great deal—

if people know how to behave under these conditions, then the later loss of life from hazards to health resulting from the conditions imposed on the country from the attack would be relatively small.

STUDY OF RADIATION PATIENTS IN JAPAN

Mr. THOMAS. There is some very accurate information available and I am sure someone here is able to give it to us, as the result of the very intense studies of actual patients in Japan in the hospital owned and operated by the U.S. Government. They have some very definite ideas they have gained from observations of very many patients that they have worked on for days and months.

There is quite a bit of very accurate and definite information available on this subject. It is one of the few subjects where there is not so much guesswork, particularly as to reproduction. In some of those cases where patients have been exposed to a large degree of radiation, we have some information about the reproduction of the second generation from those people.

Perhaps you will get into that.

Mr. YATES. He is coming out of the shelter.

PRECAUTIONS NECESSARY FOR SURVIVAL

Mr. PITTMAN. If I understand the main thrust of your line of questioning, you ask, Is it worthwhile to preserve the minority of the population we are talking about? Will enough be killed afterward, or virtually killed, so that the whole project collapses and becomes meaningless?

My general answer to you is that it is the studied opinion of the people we have been in touch with on this problem that there will be some very serious problems to health and life in the postattack period, and if we compared them to our lives today we would be quite appalled at this condition.

Related to the fatality figures we have assumed, and the lives saved by shelters from radiation, the additional loss of life from health hazards becomes almost negligible, if reasonable precautions have been planned in advance.

Mr. YATES. What do you do now?

You follow certain prescribed patterns of conduct and you can live a normal life after you come out?

Mr. PITTMAN. Within the prescribed patterns of conduct, you can. And up to the exhaustion of the food supplies, there must be a way of replenishing these food supplies. We think the water situation is not going to be a continuing problem.

Mr. YATES. Is it a problem immediately?

WATER CONTAMINATION

Mr. PITTMAN. My understanding is, there is a danger of contamination of water from the lighter fallout particles, that are almost dust being suspended in the water before they settle. They will settle within a comparatively short period of time. After they have settled, it is no problem.

Mr. YATES. Gamma rays?

Mr. PITTMAN. Yes.

By the time people would come out of their shelters, water sources would be generally usable.

Mr. YATES. You are out of your shelter in 2 weeks.

What about the 6-month factor we talked about as being the life of the gamma ray?

Mr. PITTMAN. There would be no problem of water contamination after the 6 months' period.

FOOD REPLENISHMENT

Mr. YATES. How will you get food when your supply runs out?

Mr. PITTMAN. We are talking about at least several months. As I understand the estimates of food in the pipeline, it would be a good deal longer.

There would have to be a replenishment of these supplies. Harvests in the field are not destroyed by radiation. Those harvests can be taken in.

Mr. YATES. They will have no radioactivity at all?

Mr. PITTMAN. A good rain or two will clean them off.

Most areas of the country could be planted for new crops. One of the problems would be to analyze the soil and see what areas cannot be safely used for crops, or should not be used for crops. Those areas will have to be decontaminated by scraping or plowing. There will be a large area that will be perfectly all right to use for crops.

The biggest effect on food would be livestock loss. We see no real opportunity to protect the livestock in fallout areas. We would be living on a low-meat diet, or importing food.

Mr. YATES. From where?

Mr. PITTMAN. As I pointed out earlier, great parts of the free world would not be affected by the direct impact of nuclear weapons. They would be in a position——

Mr. THOMAS. In the impacted area, dairy, milk, and beef cattle would be definitely affected?

Mr. PITTMAN. Right.

It is not a hopeless task to replenish the food supplies. This is what I am indicating.

FALLOUT SHELTERS BUILT BY INDUSTRY

Mr. YATES. Turning to your statement, I notice you have cited eight examples of companies that have built fallout shelters. Are these the only ones?

Mr. PITTMAN. No; I wanted to throw in a few hard illustrations.

Mr. YATES. How many others are there?

Mr. PITTMAN. We do not know them all. We can get you the number of companies we are familiar with and put them in the record if you like.

EFFECTIVENESS OF SHELTERS

Mr. YATES. How effective are the fallout shelters that are going to be built under your program?

Will they be total protection during the critical period?

Mr. PITTMAN. The standard set is a 100 protection factor, which means the radiation would be 100 times more outside the shelter. It is possible that an overlapping of fallout patterns in the vicinity of missile bases, as I mentioned before, could result in an extraordinary level of radiation in isolated spots on the map that would penetrate the fallout shelters and people in them would have a higher absorption of radiation than anticipated.

Mr. YATES. During the 2-week period of fallout, could you move in and out of the shelters, or would the shelters have to remain closed?

Mr. PITTMAN. Could you move in and out of them?

Mr. YATES. Without any great damage?

Mr. PITTMAN. Right; you could.

Mr. YATES. Is the effectiveness of the shelter affected by numbers of people?

You have a shelter for 50 people stated in your justification. Suppose there were 75 or 100? Would that upset the plan for survival in any way?

Mr. PITTMAN. Of course, the shelters will be all sizes.

Mr. YATES. I am talking about a 50-person shelter. Suppose there were 100 people who came in?

Mr. PITTMAN. There have been tests made on crowding here and in foreign countries which indicate that you might increase by 50 percent and possibly more the amount of people crowded in the spaces which we have planned on. It is not like a life raft.

Mr. EVINS. I am pleased that you concluded on an optimistic note. I want to observe this has been a little depressing, all this testimony. I believe there is another side to the picture.

NATIONAL SHELTER SURVEY

This program has been going on for some 10 or 15 years. We have given a lot of support; $207 million last year alone. Give us something on the optimistic side. What have we accomplished with all these expenditures? What progress have we made? How many fallout shelters do we have today? How well are the people educated on the fallout problem and dangers?

We have appropriated for emergency hospitals. After all the money we have expended, we would like to have a report as to the progress we have made. Are we making any progress? Give us a picture on the other side.

Mr. PITTMAN. The biggest recent piece of money that has gone into this civil defense objective is the funding of the national shelter survey. This is the first time we have tried to actually bring into operation any large amount of shelter space. It has been very successful.

The result of this activity is to accumulate data which will be valuable for many, many purposes, not only for bringing into use these particular shelter spaces. It is a body of data on which we can plan the future of the shelter program.

This data will be fully in hand by the end of April. It will be analyzed during the month of May. By the end of April, we will be able to analyze about 65 percent of it and will then be able to make an accurate estimate of how much shelter space there is.

I would say by the end of this year this shelter space will be in use for all practical purposes; it will be marked, stocked, and ready to go.

FEDERAL-STATE COST SHARING

Mr. YATES. Sometimes we envision this as a Federal program; other times as a State and local program. How much are the States going to share in the country's program, the cost sharing?

Mr. PITTMAN. They will not share in the cost of the shelter survey, except insofar as there are added responsibilities thrown on them for the handling of supplies and many other local arrangements. They will share 50–50 on the cost of their own programs. That is their own personnel and equipment that they use in their State and local programs, and the development of emergency control centers for continuity of government. There we split the cost 50–50 with them.

The shelter incentive program is the big new element, as far as money is concerned. We are proposing an incentive grant which will be low enough so that there will probably be additional requirements for financing. The States may be the source of that financing. In the case of New York State, they have already established funds and a law to permit them to finance school shelters. There is a bill before the Maryland Legislature to do something similar. So the States would in some areas make up the difference.

Mr. THOMAS. Do we have a program in round figures? The contribution is about $500 million and the total program will cost about $3 billion.

Mr. PITTMAN. $3 billion over 5 years. We estimate another $3 billion needed from other sources than the Federal Government. The proportion of that which would come from the States I could not estimate. It would be smaller than from private resources.

Mr. THOMAS. You gave a figure of about $6 billion or $6.5 billion in a direct answer to Mr. Evins that it is going to be over a period of 5 years; Federal costs on a contribution basis, about $3 billion, we hope, and equally that much from the State level.

Mr. PITTMAN. Yes. I thought he asked about State governments; private sources included, that would be correct.

Mr. THOMAS. Well, I mean this comes from your States. I hope you can hold those figures that low.

SUMMARY OF BUDGET ESTIMATES

Gentlemen, let's take a look at this budget. Mr. Reporter, insert pages 1 through 5 of the justification.

(The pages referred to follow:)

Fiscal year 1963 budget estimate—Appropriation and budget program summary

	1961 actual	1962 estimate	1963 estimate
Operation and maintenance:			
Warning and detection		$26,868,112	$46,160,000
Emergency operations		22,522,109	33,485,000
Financial assistance to States		21,185,799	32,000,000
Management		12,235,712	14,600,000
Subtotal		82,811,732	126,245,000
Shelter, research and development, and construction:			
Shelter incentives			460,000,000
Shelter in existing Federal buildings		17,500,000	35,000,000
Shelter survey, marking, and stockage		140,055,470	56,000,000
Research and development		15,484,834	17,755,000
Subtotal		173,040,304	568,755,000
Grand total		255,852,036	695,000,000

Fiscal year 1962 obligation data is reflected in the President's budget schedules under the appropriation "Civil defense, Department of Defense," but is shown here for purposes of comparability with the 1963 program. Fiscal year 1961 obligation data is reflected in the President's budget schedules under the Office of Emergency Planning since these civil defense programs were not transferred to Defense until fiscal year 1962.

GENERAL STATEMENT

The fiscal year 1963 civil defense program supports the program announced by the President in his message to Congress on May 25, 1961. It extends the program approved by Congress for 1962 and represents an orderly development in providing protection against nuclear attack to the civilian population without distortion of normal peacetime activities. It establishes a level of Federal participation in support of civil defense but preserves clear and important State and local responsibilities in accordance with section 2 of the Federal Civil Defense Act of 1950, as amended. The fiscal year 1963 program provides a significant step toward achieving protection for the American population.

A 100-percent effective system of military defense against ICBM's and submarine-launched missiles is technically impossible. At least during the period 1963 through 1967 we will have to rely for our survival on a combination of military and civil defense measures.

The budget estimates contained in this request by the Department of Defense total $695 million. This represents the amount required to accomplish in fiscal year 1963 the Federal Government's share of the new civil defense program assigned to the Department of Defense. In addition to the shelter program, it provides for those necessay supporting programs of: Warning and alerting; radiological detection and monitoring; communications and control; damage assessment; survival planning, training, education, and public information; research and development; technical assistance; and the civil defense contributions to State and local areas.

In fiscal year 1962 the Federal civil defense program centers on the identification, marking, and stocking of public shelter spaces immediately available in existing structures. This program has the twofold objective of developing the most economical fallout shelter in the quickest possible time and developing the data for assessing future shelter requirements in terms of location and population. This identification program is running ahead of schedule, and by the middle of calendar year 1962 it is expected to be nearing completion. The marking and stocking of these shelters is expected to be completed by the end of calendar year 1962. The first returns sufficient to provide a new basis for estimating available space in relation to population are due by the end of the first quarter of calendar year 1962. It is currently estimated that this program will provide shelter space for approximately 50 million individuals. The completion of this survey of existing buildings will not terminate the survey program—the survey, marking, and provisioning of shelter space will continue in fiscal year 1963 and future years

in suitable buildings brought into being through new construction. This will enable us to continue to take advantage of the lowest cost shelter space as it becomes available.

An additional method of giving positive warning to the population has been adopted. Problems of implementing the national emergency alarm repeater system are being thoroughly investigated and operating difficulties and responsibilities reviewed. The radiological monitoring system is being substantially improved by accelerated training programs and widespread distribution of radiological monitoring instruments. Civil defense communications are being improved by integration with the defense communications system. Training of civil defense workers has been reviewed, improved, updated, and is being made more generally available.

The objective of the shelter program is to provide suitable shelter space for as many people as possible in a systematic manner in a reasonable period of time and without distortion of normal peacetime activity. The shelter survey has indicated that a substantial fraction of the best shelter now in existence is located in downtown metropolitan areas, usually of older construction. This means that much of this shelter asset is generally located to meet the needs of the daytime population and the inner city residential population. Much less shelter exists in the suburbs. Further, in various important areas of the country, there is a scarcity of available shelter because of the nature of local construction practice. Thus, construction of additional shelter space, well located in relation to the population, is required.

The core of the fiscal year 1963 program is the acquisition of necessary fallout protection in schools and hospitals. This program is designed to develop shelter in areas where it is most needed. Further, schools and colleges have facilities for local training and organization; hospitals provide emergency supplies and a trained cadre, organized for emergency operations. While accepting Federal responsibilities and initiative, the program is conceived in a manner to attract and motivate non-Federal governments, and institutional and private organizations to assume their share of the responsibility to meet local shelter needs.

The program emphasizes the peacetime use of potential shelter space. The basic element of the program is a financial grant proportional to shelter capacity for shelter space provided in public or private nonprofit institutions engaged in health, education, and welfare activities and which meet local shelter requirements. The proposed shelter allowance is to be $2.50 per square foot of shelter space or actual cost whichever is less, providing such shelter is available to the public in the event of an emergency, has a capacity of 50 persons or more, and meets DOD minimum standards of shelter construction.

Although shelter development is a necessary part of the new civil defense program, it is not sufficient by itself. Other supporting programs are required to improve the value of shelter. The new warning system NEAR will be installed as rapidly as possible and time delays in its associated communications circuits will be reduced to a minimum. The detecting recording and predicting of radioactivity must continue to be improved. Communications and control facilities, particularly at State and local level, must be rendered more effective and less vulnerable. The provision for damage assessment must be upgraded. Survival planning will be accelerated and solutions developed appropriate to each local area. Widespread training and education calls for new methods to satisfy the public demand and the requirements of civil defense workers. Emphasis will be placed on training trainers and creating expert traveling teams for community, on-the-spot training. Packaged materials for public information for use by communities and national organizations are being developed. Research and development to reduce costs of shelters, to improve warning and other operations, and to adapt civil defense over the years ahead to changing conditions must continue at a high rate. All of these supporting Federal programs must be sustained at a rate adequate to complement and augment the shelter program.

The non-Federal responsibilities for civil defense will also require Federal assistance to achieve long-term program objectives. This assistance, both in the form of matching funds for personnel and administration as well as supplies, equipment, and facilities will be aimed at the creation of an equipped and informed State and local civil defense structure which can direct and manage shelters, warning systems, survival operations, and public information at the local level. This Federal assistance program will be administered through the Federal regional civil defense offices which will implement Federal direction and develop State and local participation in the national civil defense program.

INCREASES IN CIVIL DEFENSE ACTIVITIES

Operation and Maintenance

Object classification

[In thousands of dollars]

		1961 actual	1962 estimate	1963 estimate
	OFFICE OF CIVIL DEFENSE			
11	Personnel compensation:			
	Permanent positions			9,929
	Positions other than permanent			177
	Other personnel compensation			199
	Total personnel compensation			10,305
12	Personnel benefits			743
21	Travel and transportation of persons			1,000
22	Transportation of things			1,255
23	Rent, communications, and utilities			2,849
24	Printing and reproduction			7,210
25	Other services			43,416
	Services of other agencies			1,440
26	Supplies and materials			2,185
31	Equipment			18,298
41	Grants, subsidies, and contributions			32,300
	Total, Office of Civil Defense			121,001
	ALLOCATION ACCOUNTS			
11	Personnel compensation:			
	Permanent positions			186
	Other personnel compensation			1
	Total personnel compensation			187
12	Personnel benefits			13
21	Travel and transportation of persons			29
23	Rent, communications, and utilities			7
25	Other services			5,003
26	Supplies and materials			5
	Total, allocation accounts			5,244
	Total obligations			126,245
	Obligations are distributed as follows:			
	Office of Civil Defense			121,001
	Veterans' Administration			59
	Department of Health, Education, and Welfare			5,185

Personnel summary

	1961 actual	1962 estimate	1963 estimate
OFFICE OF CIVIL DEFENSE			
Total number of permanent positions			1,148
Full-time equivalent of other positions			38
Average number of all employees			1,174
Number of employees at end of year			1,170
Average GS grade			9.0
Average GS salary			$8,740
ALLOCATION ACCOUNTS			
Total number of permanent positions			24
Average number of all employees			23
Number of employees at end of year			24
Average GS grade			10.5
Average GS salary			$9,244

Program and financing

[In thousands of dollars]

	1961 actual	1962 estimate	1963 estimate
Program by activities:			
1. Warning and detection			46,160
2. Emergency operations			33,485
3. Financial assistance to States			32,000
4. Management			14,600
Total obligations			126,245
Financing: New obligational authority (appropriation)			126,245

Mr. THOMAS. Let me suggest we look at page 1. This is your entire program. You have "Operation and maintenance." Under that you have "Warning and detection"; "Emergency operations"; "Financial assistance to States"; and "Management." You have two big programs here, but under each of these two big programs you have divisions. With this sheet and with the index tabs on the book the presentation is very clear. The information may not be clear but the presentation is good.

Under "Operation and maintenance" you have "Warning detection." In 1962 you had $26,868,112. This year it goes up to $46,160,000.

Now, how much money was spent on this in the year 1961? That was before the separation from OCDM.

Mr. PITTMAN. We will get that figure, Mr. Chairman.

Mr. THOMAS. What is your warning and detection figure?

Mr. PITTMAN. For 1961?

Mr. THOMAS. Yes.

Mr. MCKINNEY. We will have to supply that for the record. That was all expended by OCDM.

(The information follows:)

The amount of $5,749,979 was obligated in 1961 by OCDM.

Mr. THOMAS. That is what I am getting at. Was this $26,868,000, your money, directly appropriated to this program last year?

Mr. MCKINNEY. In 1962. It was partly our money.

Mr. THOMAS. It was all civil defense money in 1961 and that is the reason you do not have the figure?

Mr. MCKINNEY. It was all OCDM.

Mr. THOMAS. What part of this $26,868,000 was appropriated to you last year? First, let's get the overall figure appropriated to you last year. What was the overall figure?

Mr. MCKINNEY. Appropriated was $207.6 million.

Mr. THOMAS. What part of that went for warning?

Mr. PITTMAN. $19,800,000 of the DOD appropriation was for "Warning and detection."

Mr. THOMAS. "Emergency operations," $22,522,000; that goes up to $33.4 million this year.

"Financial assistance to States" was $21,185,799 as against $32 million for 1963. What part of the "Assistance to States" was appropriated to you directly last year?

Mr. MCKINNEY. None.

Mr. THOMAS. It all came by transfer.

"Management," $12,235,712 as against $14,600,000 this year. What part of the management fund was appropriated?

Mr. McKINNEY. None to DOD.

Mr. THOMAS. That was all transferred.

You have a total increase from $82,811,732 to $126,245,000. That is your "Operation and maintenance" and there are 15 or 20 items mixed up in that, and we will go into some detail in a minute.

Look at your shelter program. This is your new shelter incentive program. In your new program you are requesting $460 million. None of your $207.6 million in 1961 was spent for this.

Mr. McKINNEY. That is right.

Mr. THOMAS. "Shelters in existing Federal buildings," $17,500,000. What part of your $207 million did you use?

Mr. PITTMAN. That was all out of the $207 million.

Mr. THOMAS. The $17.5 million?

Mr. PITTMAN. Yes.

Mr. THOMAS. That goes up to $35 million this year. You had a prohibition in last year's bill that no part of any Federal funds could be used for this purpose in Federal buildings; is that correct?

Mr. PITTMAN. In the Independent Offices Appropriations Act, yes, sir. There was no prohibition in the Defense Act.

Mr. THOMAS. "Shelter survey, marking, and stockage," $140,055,470 as against $56 million this year.

Did all your $140,055,000 come out of your $207 million last year?

Mr. PITTMAN. Every bit of it.

Mr. THOMAS. "Research and development," $15,484,834 as against $17,755,000. What did that come from last year?

Mr. PITTMAN. $13.5 million out of the Defense appropriation and $1,980,000 out of transfers from OEP.

Mr. THOMAS. Around $2 million you got by transfer?

Mr. PITTMAN. Yes, sir.

Mr. THOMAS. Mr. Reporter, at this point in the record will you include pages 7 and 8 from the justification.

(The pages referred to follow:)

"Civil Defense, Department of Defense

"Operation and maintenance

"For expenses, not otherwise provided for, necessary for carrying out civil defense activities, including the hire of motor vehicles; and financial contributions to the States for civil defense purposes as authorized by law, $126,245,000, of which not to exceed $18,000,000 shall be available for allocation under section 205 of the Federal Civil Defense Act of 1950, as amended. (50 U.S.C. Appendix 2251–2295; 5 U.S.C. 78; 50 U.S.C. Appendix 2281(i) and 2286; 50 U.S.C. Appendix 2286(d).)"

Appropriation summary

	1961 actual	1962 estimate	1963 estimate
Warning and detection		$26,868,112	$46,160,000
Emergency operations		22,522,109	33,485,000
Financial assistance to States		21,185,799	32,000,000
Management		12,235,712	14,600,000
Total obligations		82,811,732	126,245,000

Fiscal year 1962 obligation data is reflected in the President's budget schedules under the appropriation "Civil defense, Department of Defense," but is shown here for purposes of comparability with the 1963 program. Fiscal year 1961 obligation data is reflected in the President's budget schedules under the Office of Emergency Planning since these civil defense programs were not transferred to Defense until fiscal year 1962.

Warning and Detection Program

Warning and detection program summary

	1961 actual	1962 estimate	1963 estimate
Warning and alert		$10,000,000	$25,000,000
Radiological fallout detection and monitoring		15,350,000	19,460,000
Chemical and biological agent detection and monitoring		500,000	
Stockpile maintenance		1,018,112	1,700,000
Total obligations		26,868,112	46,160,000

WARNING AND ALERT

Mr. Thomas. Referring first to the item "Warning and detection," we will include in the record at this point pages 10 and 11.

(The pages referred to follow:)

Warning and Alert, $25,000,000

The national emergency alarm repeater (NEAR) method of alerting is basic to the new Department of Defense Civil Defense program. As shelters are brought into operation, it becomes increasingly important, even vital, to have a rapid, adequate alerting system so that the people will be able to take advantage of these shelters. NEAR provides this. It utilizes existing powerlines, and by means of signal generators, activates a receiver which is plugged into any household power outlet. NEAR operates by converting a small portion of the normal 60-cycle current to a higher frequency, thus generating a signal which can be transmitted and received over all electric powerlines without interference to the normal flow of commercial power. This is accomplished by using special equipment connected to high voltage lines. NEAR thus provides a means for almost instantaneous warning to as many people as possible with an alerting device that will operate around the clock in homes, offices, factories, farms, and all other places served by commercial electric power. Investigation has revealed that electric powerlines reach 96 percent of the population (99 percent in critical defense areas) and that they are by far the best means of transmitting a warning signal to obtain the greatest coverage.

The availability of a sound, adequate warning system which can alert the entire country will have a significant impact in implementing the total civil defense program. Effective warning is mandatory for an effective civil defense organization. Ten to fifteen minutes warning prior to the first blast can give a significant increase in the number of lives saved by protective action to minimize the effects of the attack.

NEAR will also provide an extremely significant dual-use capability. In a localized area, it can be used to alert the population for radio communication, warn of impending natural disaster, such as hurricanes, floods, tornadoes or actions which require immediate radio contact between responsible authorities and the individual citizen.

Fiscal year 1962

At the engineering and technical level, progress in the NEAR system has been satisfactory. The original specifications for this system were designed around the use of a frequency of 240 cycles per second for the signal which would trigger the home buzzer. This signal is generated in the power system and sent out over the powerlines. Although the system could be operated on this frequency, certain electrical equipment manufacturers have already called attention to the prospects over the next few years of new products, called silicone control rectifiers, to control electric current in the home, to regulate appliances, home heating, power tools, et cetera. These rectifiers might well interfere with the NEAR system operated on the 240 frequency. For this reason the NEAR equipment is being modified to operate on a higher frequency to avoid this potential conflict.

$10 million has been appropriated for fiscal year 1962 to initiate procurement of signal generators for initial installment of the NEAR system. The necessity for modification of the generator design to accommodate the new rectifier development will postpone procurement of this equipment for several months.

Fiscal year 1963

$25 million is requested to continue the development and installation of the NEAR system. During fiscal year 1963 it is planned to install this warning system on selected utility systems.

Consultations are in progress with national associations of the private electric utilities, public electric utilities, and certain other utility companies for the purpose of determining the extent to which the utilities might assume responsibilities for operating and maintaining the NEAR system and for the financing of procurement of the necessary equipment. We are particularly interested in finding a way to make the best use of the utility management through utility investment and ownership of generating equipment and possibly receiving equipment as well. The utilities have acquainted us with many practical difficulties in wedding the NEAR system with their business. It is too early to predict whether the outcome of these discussions will have any affect on the amount requested for installation of the NEAR system during fiscal year 1963.

During fiscal year 1963, every utility in the country will be surveyed as a precondition to installation of the NEAR system. Funds are requested for the following purposes:

Power system surveys	$2,500,000
Generators, coupling, and synchronization equipment for installation in selected systems	22,500,000
Total	25,000,000

NATIONAL EMERGENCY ALARM REPEATER

Mr. THOMAS. Now we have national emergency alarm repeater. What is to be the total and final cost? We have $25 million here but what will be the ultimate cost.

Some people came up with a figure of $500 million and others have said $1 billion. We have $10 million in 1962, $25 million this year. I notice here you have several months delay for 1962. If you have this delay for 1962, how many months delay will you have for 1963, Mr. Pittman?

Mr. PITTMAN. Once the delay is over we are going to move very rapidly. The reason for this delay is a technical problem which I will have Mr. Visher explain to you. It concerns a new development by appliance manufacturers.

Mr. VISHER. The old transmitter operated at a frequency of 240 cycles. There is a new solid state device called a silicon-controlled rectifier which is much like a diode, or a transistor. It is expected that these rectifiers will be widely used in light dimmers and other electric power control mechanisms. This device can produce an impulse at 240 cycles frequency which could interfere with a warning signal generated at that frequency. We are using the same receiving device which had been contemplated previously but we are developing a transmitter for use at 255 cycles.

Mr. THOMAS. For this reason your equipment is being modified to operate on a higher frequency to avoid this potential conflict?

Mr. VISHER. That is right.

Mr. THOMAS. How much time will it take? When will you get in business?

Mr. VISHER. We are working with about three utilities at the present time. We expect to have test hardware of a new configured transmitter in the next 3½ or 4 months.

JUL 5 1962
MANHATTAN, KANSAS

Mr. THOMAS. Is that $10 million of your money spent in 1962? For 1963 it is $25 million.

Mr. VISHER. Because of the delay we have reprogramed out $5 million from the $10 million. We now are contemplating spending only $5 million this year rather than the budgeted $10 million.

Mr. THOMAS. Have you obligated your funds?

Mr. VISHER. We have not.

Mr. THOMAS. Has any part of your $10 million last year lapsed?

Mr. VISHER. It will lapse if not obligated or reprogramed to other high priority requirements.

Mr. THOMAS. All of it?

Mr. VISHER. All of it that is not used will lapse.

Mr. OSTERTAG. The whole $10 million?

Mr. PITTMAN. The question is what part of the $10 million will lapse on June 30.

Mr. VISHER. I am sorry.

There is $5 million in this item in the budget at the present time that will lapse if it is not spent or reprogramed.

Mr. OSTERTAG. Let me see if I can develop a clearer picture. You had $10 million and you have expended how much? How much will you spend or obligate in this present fiscal year?

Mr. VISHER. We expect $5 million of that $10 million in this fiscal year.

Mr. OSTERTAG. There will be approximately $5 million that will lapse of the previous appropriation?

Mr. VISHER. Which has been reprogramed, right.

Mr. OSTERTAG. What do you mean by "reprogramed"?

Mr. PITTMAN. It will lapse in one sense. I think we will probably have to explain at this point a rather larger problem. In starting this new program, there are a number of items which have exceeded our cost estimates. A number of others are under our cost estimates and we have made some adjustments within the budget.

Mr. THOMAS. You did not spend it for the purpose for which it was appropriated. They did not let it lapse, in other words: they reprogramed it.

Mr. OSTERTAG. Within this fiscal year?

Mr. PITTMAN. Within this fiscal year.

Mr. OSTERTAG. How could you do that? Under what authority could you do that?

Mr. PITTMAN. It is our understanding we have the authority to do that.

Mr. THOMAS. You are correct. It is a lump-sum appropriation.

Refer to this appropriating language on page 7. It is a lump sum for expenses not otherwise provided for, necessary for carrying out civil defense activities.

Is this your appropriating language for it?

Mr. PITTMAN. Yes; it is.

Mr. OSTERTAG. In other words, you intend to use the entire $10 million during the current fiscal year?

Mr. PITTMAN. We may very well return some money to the Treasury on June 30. It is a little early for us to tell. There are several parts of this program that are running into substantially higher expenses

than we anticipated. We are not going to do anything other than the ongoing programs, but in order to finance these ongoing programs we may require some reprograming of funds. We have made a projection which tells you where we stand at the moment.

We have that in table form and it was made available to the committee as a part of my general statement.

Mr. OSTERTAG. These are 1-year funds?

Mr. PITTMAN. Yes; they are.

Mr. OSTERTAG. So your reprograming is within this fiscal year and would have to be expended within this fiscal year?

Mr. PITTMAN. That is correct.

Mr. OSTERTAG. That is what I am trying to clear up, as to when, where, and how this takes place.

CHRONOLOGY OF WARNING SYSTEMS DEVELOPMENT

Mr. THOMAS. How does this system differ from the old one? What is the need for a new one? Tell us about NEAR.

What is wrong with the old system? How much is this going to cost you over the next 5 years? Is that figure of $500 million right that we heard some time ago?

Mr. VISHER. The figure of $500 million appears to be the best estimate yet. That is for a total program cost including receivers and transmitters.

Mr. OSTERTAG. Are you speaking of the NEAR system?

Mr. VISHER. We are speaking of the NEAR system.

Mr. OSTERTAG. It states in your justification that the total NEAR system is expected to cost in excess of $600 million.

Mr. VISHER. This is part of the change resulting from a change in transmitter. The transmitter costs appear to go up slightly, but the recently estimated drop in receiver costs brings the total down since preparation of the justification.

Mr. THOMAS. Why the change now? Let us get to the chronology. You have had a system in effect for 10 years. Why the change? What efficiency will the NEAR system have over what you have now?

Mr. VISHER. We have had an outdoor warning system for 10 or 12 years. In 1956 there was a development of a——

Mr. THOMAS. Explain what we have had for the last 10 years and then tell us what you are doing by the change that will cost from half a billion to a billion dollars.

Mr. VISHER. What we have had for the last 10 years has been a siren system, a siren system which has been activated by a warning net which blows sirens. We have a very effective net in Washington. Other parts of the country have not been so effective. It is basically an outdoor warning system. It is ineffective in buildings to any large degree. If we were in this office building now a siren system would be quite ineffective.

There was a recognized need developed from tests, to have an indoor warning system where a buzzer or some noise would go off. This generated a requirement for the NEAR system. The NEAR system, as I said, was developed, was tested, and two transmitters were installed in 1959. It was tested in 1960 by OCDM, and this was the basic system we were trying to implement with this $10 million.

Mr. THOMAS. Do we know NEAR is going to work yet? Do we have that specific proof?

Mr. VISHER. We have specific proof you can transmit these frequencies over long distances and that you can receive frequencies of the——

NEED FOR INDOOR AND OUTDOOR WARNING SYSTEM

Mr. THOMAS. Will this new system eliminate the need for your entire alarm system that you have had for the last 10 years?

Mr. VISHER. We do not believe it will. We believe there is still a need for an outdoor warning system.

Mr. THOMAS. That will not be changed?

Mr. VISHER. People in cars, people outside, will receive no benefit from the NEAR indoor warning.

OPERATION OF PRESENT WARNING SYSTEM

Mr. THOMAS. Start at the beginning. How does your present warning system work now?

Mr. VISHER. In the present warning system there is a detection of a missile, or an airplane, at NORAD Headquarters.

Mr. THOMAS. Where is NORAD Headquarters?

Mr. VISHER. In Colorado Springs.

Mr. THOMAS. First we have the DEW line and then what else?

Mr. ROMM. We have the ballistic missiles early warning system, the distant early warning line, the Mid-Canada system, and the Pine Tree system.

Mr. THOMAS. You get a signal from one of those and where is it transmitted? It is an automatic signal process?

Mr. ROMM. It is transmitted to NORAD combat control center at Colorado Springs.

Mr. THOMAS. What happens there?

Mr. ROMM. It is evaluated at their headquarters and determined whether this is in fact an attack on the continental United States. If it is, the warning is transmitted from that headquarters to the regional commands of the North American Defense Command.

Mr. THOMAS. How many are there?

Mr. ROMM. There are seven locations.

At these seven locations are civil defense warning personnel. They get the information at the same time that the military get the information. The warning information is passed on through the national warning system.

Mr. THOMAS. It first goes to the regional headquarters, does it not, or does it go simultaneously to State and regional headquarters?

Mr. ROMM. The warning is sent simultaneously to Federal, State, and some local warning points. When this warning is received at the 450 points at the end of the national warning system, which is being expanded to 500 points this year, it is pretty deep down into the local government level. There the sirens are activated.

Mr. THOMAS. That is when the bells ring?

Mr. ROMM. That is right.

OPERATION OF "NEAR" SYSTEM

Mr. THOMAS. How does this NEAR system change all that?

Mr. VISHER. The NEAR system changes this by taking it automatically from the point of decision to warn the public down through these wires and is automatic, without going through a human evaluation and automatically triggers a transmitted——

Mr. THOMAS. It still goes to the seven command headquarters, doesn't it?

Mr. VISHER. Yes; and it goes down from there. It can go from the point of decision to warn the civilian population.

Mr. THOMAS. Does it still have to go to our State and regional headquarters?

Mr. ROMM. You go down through parallel channels. This means it can go down through the utilities grids to make the decision to alert the civilian population. This activates a transmitter which is on the utility grids and this signal goes out. It can also go down through the NAWAS net to go into the local utility grids. There are some 3,400 utility networks we have to tie together.

Mr. THOMAS. This will cost from $500 million to $1 billion. How much more accurate will it be than what you have now?

INSTALLATION OF WARNING SYSTEM IN PRIVATE HOMES

Mr. PITTMAN. There are two main changes. One is to bring the warning into the homes where it is necessary, we believe, for an effective warning system. The other is that the system would work faster. It will be a more instantaneous warning. To make effective use of any system of shelters, we think both a greater reach of the warning system and greater speed could result in a direct saving of many lives and we think it is worth it.

Mr. OSTERTAG. Every home?

Mr. PITTMAN. It is proposed as a voluntary system and not a mandatory one. People who do not want this black box in their home would not be required to have it.

Mr. THOMAS. What will the user pay for it?

Mr. VISHER. The estimated manufacturing cost is between $5 to $7.

Mr. THOMAS. He pays the freight on it and somebody will profit. What is the markup?

Mr. PITTMAN. The estimated retail price would be $10 to $15.

Mr. OSTERTAG. How about the installation?

Mr. VISHER. It is plugged into a plug in the wall.

Mr. THOMAS. When will it be definitely established that you can do this? When will there be no doubt about it?

Mr. PITTMAN. There is no doubt about the technical feasibility of it. There are unsolved questions as to how it should be installed.

Mr. THOMAS. Have you made any contracts with any of the power companies or utilities?

Mr. PITTMAN. We have only made survey and test contracts. There has been no contract to install it completely in any utility system yet.

ULTIMATE COST AND FINANCING OF "NEAR" SYSTEM

Mr. THOMAS. This $600 million that you set out in your budget will be for the services of the utility companies?

Mr. PITTMAN. It will go to the cost of the equipment. A negligible portion will be for services. This will be primarily for the cost of the receivers and the generators and the largest part of that is the cost of the receivers in the homes.

Mr. THOMAS. Do you mean the $600 million will be spent to buy the receivers in the home rather than to pay the utilities?

Mr. PITTMAN. Well, I was just going——

Mr. THOMAS. I didn't understand your justification on that basis.

Mr. PITTMAN. There is a question of who incurs the equipment costs, which is still under review. Our original plan has been that the Federal Government would finance the generators, we would put them into power stations and the consumer would buy the instrument to put it into the home.

Mr. THOMAS. The $600 million in your justification is to pay the utility costs?

Mr. PITTMAN. This is the total cost of the system, not just the Federal cost, the cost to the consumer as well. The larger part of it is the cost for instruments to go in the homes.

We are exploring the possibility of drawing the utility systems into much fuller responsibility for this system and, if possible, into processing and financing the instruments in the homes, as well as the generators. We have no basis as yet to be optimistic that we can bring this about. What we want to do——

Mr. OSTERTAG. Mr. Secretary, it is confusing to me as to what your total costs and responsibilities will entail. Whether it be $500 or $600 million is not the question at the moment, although it would seem that there is a discrepancy as between what you estimated originally and what you are now believing to be the actual total cost.

Out of this $500 or $600 million as the case may be, you are describing in part an individual home appliance or mechanism which on the one hand you say will be a responsibility—so far as costs are concerned—to the individual homeowner, office or wherever it may be and yet if I understand you correctly, you are including this in the overall budgetary item of $500 or $600 million which is the ultimate cost.

If that is not a part of this, then why do you estimate that it is going to cost the Federal Government $500 million?

Mr. PITTMAN. We have not made that estimate. We are estimating a total cost to the country of $500 million, not the Federal cost.

Mr. OSTERTAG. How much will it cost the Federal Government and how much return will there be to the Government for these instruments?

CURRENT PLANS FOR "NEAR" SYSTEM

Mr. PITTMAN. The original plan described last August was that the generators be financed by the Federal Government and the home units would be purchased by the homeowners.

We have some reservation about a system where homeowners would be expected to intelligently procure an item which is subject to some

of the variables that go into the manufacturing of this simple gadget. Quality control problems are what I primarily have in mind.

We also are concerned about the inspection and maintenance of this system. We believe the best answer is for the utility systems to take on this responsibility. We have been exploring this with them intensively for some months. One possible result would be that the utilities would, in effect, finance both the generators and the units that go into the home, and amortize the latter over a short period of time.

Mr. OSTERTAG. If I may interrupt you, your plans and your programs are not definite or clear.

Mr. PITTMAN. We have not changed them yet, but you are quite right. This is true of many parts of this program, which has been moving very rapidly and unfolding very fast. We think we ought to maintain a certain flexibility to come to the right conclusions at the right time. We have a definite plan dating back to last August which we described, which is very familiar to Congress. What we have under consideration now is a departure from this plan, but we have not yet developed an adequate basis for the departure.

Mr. THOMAS. You want $25 million in 1963. $2.5 million is for power surveys and $22.5 million for generators, couplings, and synchronization equipment for installation of selected systems.

That is more or less a testing system, $22.5 million.

The $22.5 million is going to be spent by you to experiment with somebody else's property. When you get through spending this, is this going to be the end of the expenditure for establishing this new system?

Mr. PITTMAN. Under the present plan, which we haven't departed from yet, we would go on to a further expenditure in fiscal year 1964 for the rest of the generators.

Mr. THOMAS. How much would that be?

Mr. VISHER. About $100 million total for the generators.

Mr. PITTMAN. A little less than $75 million for fiscal year 1964.

Mr. THOMAS. Some people have estimated it will cost you $600 million or even more than that by the time you get through with the utility people; buying generators, paying them fees for this and so forth and so on.

Mr. PITTMAN. And this includes the units in the home.

NEED FOR "NEAR" SYSTEM

Mr. THOMAS. From what you see of the program, is it worth the money to start this new program which could easily cost the taxpayer $600 million? That is the question I want to have answered.

Mr. PITTMAN. The answer is clearly "Yes," in our view. In the alternative plans I have described here, neither one would cost the taxpayer anything like $500 million, the total cost figure which we estimated, because the cost of the units to go into the home would not be borne by the Federal Government.

Mr. THOMAS. Can you improve on the system that you already have and that you have bought and paid for?

Mr. PITTMAN. We think it should be many times more effective. We have serious reservations about the effectiveness of the present system.

Mr. THOMAS. In most cities and particularly small towns, when they have a fire they ring a bell and everybody understands that.

Mr. PITTMAN. We are a little worried about their thinking a nuclear attack might be a fire.

Mr. THOMAS. Where are they going here?

Mr. PITTMAN. They will go into shelters or to the best cover they can find. Plans are being developed now around the country by State and local civil defense organizations.

Mr. THOMAS. Well, in either case, regardless of how they are warned, they will be going to the same location and it is a question of which is the more effective warning. Now, a warning system is quite valuable. There is no question about this, but you apparently do not know whether this system will work regardless of its cost.

ROLE OF UTILITY COMPANIES

Mr. PITTMAN. There is no question about its working. The only element of uncertainty is, which is the most practical and effective way to install it in these 3,400 utility companies.

Mr. THOMAS. You have to get permission from 3,400 utility companies. You cannot use their property without their permission unless you pay them for it.

Mr. PITTMAN. There is no problem, as far as we can see, about using their property and installing the system. The only problem is how much responsibility they will take for the system.

LENGTH OF TIME BEFORE "NEAR" SYSTEM IS OPERATIONAL

Mr. THOMAS. What part of your total need will the $22.5 million satisfy in the way of generators and equipment?

Mr. VISHER. About a fourth. About $100 million total of generating equipment.

Mr. THOMAS. How long will it take you to spend this $22 million and get that in operation?

Mr. VISHER. We can get this much money in operation very effectively in 1 year.

Mr. THOMAS. How long will it take you to complete the job?

Mr. VISHER. It will take about 2 years to install the system in a total sense once all the operating details——

Mr. THOMAS. One year's leadtime in procurement of the items, and another year installation time?

Mr. VISHER. We are getting deliveries from three different companies in about 4½ months on the items, so it is an item that has a great deal of shelf hardware.

Mr. THOMAS. You first said 2 years. Are you going to reduce that period?

Mr. VISHER. I think it will take a year starting from July of 1962 to July 1963 to spend this first one-fourth of the program, and the following three-fourths will start July 1963.

Mr. THOMAS. How long will it take you to install it?

Mr. VISHER. Once we receive the hardware, it should take about a month or a month and a half to install.

Mr. OSTERTAG. You are speaking of the generators and synchronization?

Mr. VISHER. Yes, and fitting it into the utility networks.

RADIOLOGICAL FALLOUT DETECTION AND MONITORING

RADIOLOGICAL DETECTION EQUIPMENT

Mr. THOMAS. How valuable and how necessary is surface monitoring, $10,570,000?

Mr. PITTMAN. I think the discussion we had a while ago about the conditions in the postattack period brings out quite clearly the significance of radiation detection equipment.

Mr. THOMAS. Approximately 150,000 monitoring stations are needed. Will every fallout shelter be a station, or every other one?

Mr. PITTMAN. The larger ones will be.

Mr. THOMAS. What about aerial monitoring, $150,000? What about these dosimeters?

They will be located in the shelters selected for monitoring. These are $4 each. How many do you already have? We have been buying them for years and years and years. How many do we have on hand now?

What about these 121,000 monitoring kits? You have not spent any money for these in 1961, have you?

Mr. ROMM. OCDM had money.

Mr. MANNING. My recollection is there was some.

Mr. PITTMAN. There was not enough money for needed expenses. Forty-two thousand four hundred and fifty-two monitoring kits were procured in 1961.

AERIAL MONITORING

In reference to aerial monitoring, the monitoring stations in shelter and at select locations will not give the area and geographical coverage required particularly in rural and agricultural areas. We are now procuring 1,000 of these aerial monitoring instruments with 1962 funds. The $150,000 requested in this budget is to procure an additional 200 instruments. More aerial survey instruments will be needed later to fill out an effective aerial survey capability.

Mr. THOMAS. How much money?

Mr. MANNING. It ran in excess of $4 million in 1961.

Mr. THOMAS. How much did you have last year for kits?

Mr. JOHNSON. For kits, around $9 million.

Mr. THOMAS. Do you not have enough of these kits already?

Mr. VISHER. No, we do not have enough of these kits. I think the discussion here on what you will do when you come out of the shelter, what do you have to do with the water illustrates the need very well. For example the CDV–700 instrument is a device for measuring contamination and giving you answers on just these kinds of questions.

If you are going to have a shelter, you have to have ability to come out of the shelter, and this instrumentation gives you that kind of ability. We have about 50,000 monitoring sets available. Fiscal year 1962 procurement will add another 129,000 sets. Fiscal year 1963 procurement, of about 121,000 sets, will give us a total of 300,000 sets, or 2 sets per monitoring station.

Mr. THOMAS. Two for each shelter?

ACQUISITION OF DOSIMETERS

Mr. McKinney. To answer your question on dosimeters, we bought none for civil defense workers prior to 1962. This will be our first procurement related to this requirement.

Mr. Thomas. You bought them for high school students and everyone else. It does not make any difference who uses them. They serve the same purpose.

Mr. Ostertag. Did you not distribute those for training purposes?

Mr. McKinney. Yes.

Mr. Ostertag. That was under OCDM, of course?

Mr. Romm. Those were the high school kits.

Mr. Thomas. You bought thousands of dosimeters.

Mr. McKinney. According to this table, OCDM bought 168,000 as a part of the kits.

Mr. Ostertag. Right on that point, the justification refers to the fact in fiscal year 1962 we made funds available for 1 million of these dosimeters for workers, and this budget calls for 2 million more.

How many of the 1 million have been supplied?

Mr. Visher. We have procurement orders out now that call for $12 million, not only for the dosimeters, the CDV–742 instrument, but also the CDV–715 survey meter, and a Geiger counter, CDV–700.

There are three different kinds of instruments. We do have procurement presently in process to buy the total of the sets named here, 129,000 sets. These sets include the 742 dosimeter.

We have bought dosimeters which will be distributed to some of the shelters.

Mr. Ostertag. You say you had $1 million in funds.

You have used that money?

Mr. Visher. We are using this money in procuring this hardware.

Mr. Ostertag. Will that be expended in fiscal year 1962 for this equipment?

Mr. Visher. That is right.

Mr. Ostertag. Your plan is to add 2 million more to the program?

Mr. Visher. Yes.

Mr. Ostertag. That will be on a broader basis.

DISTRIBUTION OF DOSIMETERS

Where will these instruments be used?

As I recall, there was a general-purpose use of these dosimeters and this other monitoring equipment for training and other purposes in general distribution, but what is the plan for the 3 million? You received 1 million this year and plan 2 million for next year.

Mr. Visher. These will go into shelters. We are tying the shelter system to the monitoring system. We are putting each monitor station in a protected area, with a protection factor of 100. The dosimeters will be placed in the shelters for use by the workers when they can emerge from shelter. Without the dosimeters, the workers will be needlessly exposed to excess radiation.

Mr. Ostertag. Will you have that many shelters by the end of this next year?

Mr. VISHER. We expect to have on the order of 200,000 shelters located. We will have at least two dosimeters per shelter and up to 10 in the larger shelters. Some of these shelters run 200 to 300 or more people. These larger shelters will be the location of the monitoring points and locations from which the main working force will be sent out. Most of the dosimeters will be located in these shelters.

SUMMARY OF ESTIMATE FOR RADIOLOGICAL FALLOUT DETECTION AND MONITORING

Mr. THOMAS. We will insert pages 12, 13, and 14 in the record. (The pages referred to follow:)

RADIOLOGICAL FALLOUT DETECTION AND MONITORING, $19,460,000

Radioactive fallout from a nuclear attack could endanger the lives of more people than any other resulting hazard. Therefore, a nationwide capability of detection, monitoring, and reporting is necessary in order to provide information for assessment of damage effects and accessibility and availability of surviving resources as well as to warn each citizen of the varying levels of radiation within each locality, at regular intervals of time. Establishing and manning monitoring points is a State and local responsibility; however, radiological instruments and instructor training can best be provided by the Federal Government. Funds requested for this budget subactivity are distributed to the following purposes:

(*a*) *Surface monitoring, $10,570,000*

Approximately 150,000 monitoring stations are needed to provide State and local civil defense units the necessary capability to measure and evaluate the radiological situation resulting from a nuclear attack. These stations will be located at selected shelters and manned by personnel of municipal services, such as fire, police, public road departments, hospital, and high school and grade schoolteachers, in areas close to the shelter spaces identified in the shelter survey. Reports from these stations are also forwarded to regional and national headquarters. OCDM had purchased 49,608 sets. With the funds appropriated in fiscal year 1962 OCDM will procure approximately 129,290 more sets. This fiscal year 1963 request will procure an additional 121,102 kits, bringing the total to 300,000 sets of instruments, or 2 sets for each monitoring station. This will complete the initial equipping requirement for surface monitoring equipment.

Each station is to be equipped with beta-gamma low-range survey meters for food, water, and personnel monitoring; high-range gamma only instruments for general reconnaissance and for determining effectiveness of decontamination operations; plus dosimeters and associated chargers for the monitoring station personnel.

This requirement will not provide any replacement for wornout equipment nor will it provide any equipment for Federal or local stockpiling for use in postattack rehabilitation. This latter requirement will be budgeted for in fiscal years 1964 and 1965, and replacement equipment budgeted as necessary.

Emphasis in fiscal years 1962 and 1963 is on distributing these operational sets to the monitoring stations. This is to be made feasible by an intensive training program which will provide traveling radiological training teams to each metropolitan area prior to the distribution of these sets.

It is estimated that in quantity procurement each of the 121,102 kits will cost $87.26 including transportation and spare parts, for a budget estimate of $10,570,000.

(*b*) *Aerial monitoring, $150,000*

Aerial monitoring offers the most rapid method of estimating the degree and extent of fallout contamination over large areas in the early postattack period. Its advantages are speed, accuracy, and that it can be carried out regardless of the location or the severity of the radiation level, since radiation levels in the aircraft are many times lower than on ground. By knowing the altitude, the ground intensities can be rather accurately estimated; hot spots, however, might be missed. Aerial monitoring exploits the capability of many small aircraft, mostly privately owned, that are expected to survive because of their dispersal.

An instrument specially developed by Oak Ridge National Laboratory for aerial survey is expected to be ready for procurement in fiscal year 1962. A minimum of one unit per 3,000 square miles is needed. In fiscal year 1963, it is proposed to procure 200 units in addition to the 1,000 units provided for in fiscal year 1962. The estimated cost is $750 each, totaling $150,000. With the exception of replacement equipment this substantially completes procurement of aerial monitoring equipment of this type.

(c) *Meters for civil defense workers, $8 million*

Most emergency workers will have to perform their postattack duties in areas contaminated by fallout. To control their exposure to radiation and assure they will not become casualties or fatalities, it is proposed to provide them with cumulative dose measuring devices. These dosimeters will be located in the shelters selected as monitoring stations. It will not be necessary to provide chargers for these dosimeters because of the already wide distribution of chargers for other purposes.

In fiscal year 1962, funds are available to equip 1 million workers. In fiscal year 1963, it is planned to equip 2 million additional workers at an estimated cost of $4 per dosimeter, or a total of $8 million.

(d) *Calibration kits, $240,000*

Radiation detection instruments must be calibrated periodically as circuit element changes may result in serious instrument inaccuracies. Two calibration units per State and two per civil defense region and civil defense school are needed, totaling 120 units at an estimated cost of about $3,000 each, or $360,000. One-third of this amount ($120,000) for 40 units is provided for in fiscal year 1962. It is planned to complete procurement of this initial equipment in fiscal year 1963.

(e) *Automatic monitoring prototype system, $500,000*

This is a project to design, construct, test, and operate a prototype automatic radiation monitoring and reporting system.

In fiscal year 1962, a research project is being initiated to design the necessary hardware and system configurations. The project requires development of the prototype system including specific location of monitoring stations and the collection center, equipment to be used, identification of development requirements and installation of the equipment. It also includes determination of communication requirements and methods.

It is estimated that development of equipment and prototype installation costs will be $500,000.

CALIBRATION KITS

Mr. THOMAS. Calibration kits equipment is shown, $240,000. How much money have you spent in the last 3 or 4 years on this particular type of equipment? What becomes of all this equipment? Do you have the breakdown?

Mr. MCKINNEY. We did not have the program, so we do not have the figures.

Mr. THOMAS. Do you have any idea?

Mr. PITTMAN. Since 1961 the only funds for this type of equipment are in the fiscal year 1962 budget for 40 calibrators. The fiscal year 1963 budget includes funds for 80 additional units.

Mr. JONAS. What are you going to do with these calibration kits? You have two per State and two per civil defense region. Are you going to employ someone to go around from community to community and test the equipment?

Mr. VISHER. The detailed plans for calibration are under development. The instruments are calibrated by the manufacturers and the States, to date, have been responsible for recalibration.

USE OF CALIBRATION KITS

Mr. JONAS. You are going to distribute the equipment on a local basis in your shelters, and a calibration set in a capital is not going to be much good unless you get it out to the country where the equipment is to be tested.

Mr. VISHER. We are working with a task force set up by the Civil Defense Council and the State Directors on Radiological Monotoring to develop methods for most effectively calibrating these instruments in shelters.

A mobile calibration system makes more sense. We want to look at the cost of moving meters into a State maintenance point on a scheduled basis versus the cost of moving the maintenance and calibration points out to the meters themselves.

Mr. JONAS. There really is not any way to estimate how much this will all cost when you get through?

Mr. PITTMAN. The cost you refer to is the cost of man-hours of calibrating.

Mr. JONAS. You have to buy a mobile unit to take the calibration kit around. You have to hire a man to do it. He cannot work but 40 hours a week. How long will it take him to get around the State of Texas, to go to every community where they have a shelter?

Mr. PITTMAN. This is part of the investigation the task force is reviewing. There might be different solutions by States, because the States must take on a good part of this responsibility.

Mr. JONAS. Had we not better wait and not buy the kits until we know how to use them?

Mr. PITTMAN. If you do not buy the kits, you do not get the State and local civil defense organizations to work with you.

Mr. JONAS. Do you think we ought to recommend to the Congress an appropriation of $240,000 to buy kits when you cannot even tell us how you plan to use them?

Mr. THOMAS. How did we get along without them the past 7 years? We have been buying a lot of equipment.

PLANS FOR DETECTION EQUIPMENT

Mr. JONAS. I think you owe the committee more information than this, Mr. Secretary. You do not have any plan to use this equipment?

Mr. PITTMAN. We do have a plan; it is subject to local implementation.

Mr. JONAS. I wish you would explain it for the record.

Mr. PITTMAN. There is no question that many parts of this program are still in development. Neither we nor you can avoid the fact this hearing must come up at a time when we are still developing a new program. I think it should be plain that the availability of radiological detection equipment and the capability to use it must exist at the very local community levels throughout the country if there is to be a shelter system. This means we will have to probably go beyond the figures you have here for future instrument procurement. In fact, in another part of the budget you will find some lower cost radiation detection equipment to be put into the shelters provisioned by the Federal Government but not used as part of the monitoring

system. So you have not seen the full picture yet, as to the extent of our radiation equipment requirements.

There must be the ability to calibrate it, and periodically inspect and recalibrate it on an annual or semiannual basis. Any plan will require the use of the operational calibrator. Since they will be effective if granted to the States and used with the presently established maintenance systems, procurement should go forward. If the maintenance system review indicates one of the mobile plans to be effective and economical, the operational calibrator can be integrated into the system without difficulty.

RESPONSIBILITY FOR CUSTODY AND MAINTENANCE OF DETECTION EQUIPMENT

Mr. JONAS. Who will be in charge of all this equipment?

Mr. PITTMAN. The State and local civil defense organizations will take the responsibility for maintaining it. They have indicated they can take this responsibility, and in some cases they will have their own reasons for developing modifications of any overall national plan and adapting it to the local situation. There probably cannot be a single fixed plan for calibration. We will simply provide them with requirements, equipment, and guidance on procedure. They will have to provide the actual capability at State and local levels.

Mr. JONAS. I mean the other equipment you are going to be calibrating. It will have to be kept under security, will it not?

Mr. PITTMAN. Yes; it will.

Mr. JONAS. How do you propose to do that in community X out in the middle of Texas, or the middle of North Carolina where you have a shelter?

Will you have a permanent staff to be in charge of the shelter and the equipment and the foodstuffs, and so forth?

Mr. PITTMAN. This has to be the responsibility of the State and local civil defense organizations. This means there must be a place under lock and key, not only for the radiation equipment but other shelter supplies that would be in the sheltered areas where these monitor stations would be located—medical kits, food rations. There will have to be a place in each of these locations that can be secured. There will have to be policing and inspection of each shelter area.

The State and local governments have to take this responsibility. The Federal Government will provide them with the requirements. We will provide them with manuals and information on how to do it.

APPROPRIATIONS FOR RADIOLOGICAL EQUIPMENT

Mr. THOMAS. May I interrupt you?

For this radiological equipment by years, here are the appropriations.

In 1955, $1.5 million; 1956, $5 million; 1957, $3.9 million; 1958, none; 1959, $1.8 million; 1960, $2.8 million; 1961, $4.2 million.

So you have in round figures, $19 million tied up in this equipment since 1955.

LOCATION AND CONDITION OF EQUIPMENT

Mr. JONAS. Where is all this equipment? Is it intact in places dispersed?

Mr. PITTMAN. Some is in the hands of State and local governments and some with Federal agencies. There are about 50,000 monitoring sets in our inventory that provide the base for the initial equipping of these monitoring stations.

Mr. JONAS. How long will they last without deterioration?

Mr. PITTMAN. They have a very long shelf life, but some parts may need replacement. There is a problem of recalibration periodically.

Mr. JONAS. Have they been recalibrated since they were purchased?

Mr. VISHER. Some recalibration has been done.

STOCKPILE MAINTENANCE

Mr. THOMAS. Turn to pages 15 and 16. We will insert them in the record at this point.

(The pages referred to follow:)

STOCKPILE MAINTENANCE, $1,700,000

The procurement and stockpiling of survival type items were undertaken, during prior years, by both the Federal Civil Defense Administration and by the Office of Civil and Defense Mobilization, as a Federal means of meeting postattack requirements for civilian survival. These items are stored and maintained through a nationwide system of strategically located warehouses, as a means of best assuring their availability during an emergency. Funds requested herein are to meet those costs directly related to the continued warehousing and maintenance of the engineering and radiological items procured during prior fiscal years, plus similar costs associated with the procurement of additional radiological instruments planned for fiscal year 1963. Arrangements are being completed with the Defense Supply Agency for assignment of functions for accountability and management of the civil defense stockpile to the Defense General Supply Center. Associated storage and distribution costs through fiscal year 1963 are included in the civil defense budget estimate.

(*a*) *Warehouse operations, $935,000*

OCD is utilizing space in 24 strategically located facilities. Funds requested provide for the continued operation of these facilities and include reimbursements for rentals, services, and labor. The fiscal year 1963 request represents an increase of approximately $210,000 over the fiscal year 1962 requirements in order to provide the additional warehouse operating personnel and radiological instrument technicians necessary to carry out the greatly expanded radiological instrument program scheduled for fiscal year 1963.

(*b*) *Testing of stocks, $40,000*

The estimate provides funds for payment of fees charged by the Bureau of Standards for testing prototype of radiological instruments furnished by the various manufacturers bidding on OCD contracts, and other Federal agencies for testing of chemical, biological and engineering stockpile items as required. Funds requested are to provide for the continuation of these services at approximately the current level of operation.

(*c*) *Maintenance of stocks (engineering), $100,000*

The estimate provides funds for storage and maintenance costs for forty-five 10-mile units of emergency engineering stockpiles stored at 21 strategic locations across the Nation. Of the 21 engineering storage sites, 19 sites, or 43 units, are stored and maintained through cross-servicing agreements with the Department of Army, Veterans' Administration, and General Services Administration. Two units are stored and maintained through contract agreements with the State of Vermont and with a private contractor at Thomasville, Ga. In addition, this activity provides the funds required for replacement parts, special modifications,

and reconditioning required after return to storage from loan for training of major disasters, as may be required for the entire stockpiled forty-five 10-mile units and other specialized engineering equipment. Funds requested are to provide for the continued operation of these facilities at the current level of operation.

(*d*) *Transportation, $500,000*

The estimate provides funds for the distribution of radiological, chemical, and biological supplies and equipment in accordance with program requirements, and includes shipments between warehouses in the event the need arises, including shipments of instruments or equipment requiring special repairs. Funds requested represent an increase of about $365,000 over fiscal year 1962 requirements in order to provide the additional transportation and packaging supplies necessary to meet the greatly expanded radiological instrument program scheduled for fiscal year 1963.

(*e*) *Replenishment of maintenance supplies, $125,000*

This provides funds for the replacement of deteriorated batteries for radiological instruments; replacement of other replenishment supplies which deteriorated and would no longer be suitable for issue or use; the procurement of packaging supplies and special containers required for the packaging of assembled radiological and chemical kits; procurement of spare parts for older model radiological instruments and chemical items; and procurement of necessary test equipment for the radiological instrument maintenance shops and test equipment incident to the establishment of a calibration program; and for the procurement of specialized supplies and equipment for decontaminating purposes if a requirement should arise. Funds requested are to provide for the continuation of these activities at approximately the current level of operation.

USE OF FEDERAL FUNDS FOR CIVIL DEFENSE ADMINISTRATIVE COSTS

Mr. JONAS. I would like to make a comment on the last statement Mr. Pittman made: It is the responsibility of the local communities in the States to take charge of this equipment.

We thought it was going to be their responsibility to run their local offices, but after about 3 or 4 years of constant barrage and pressure, we finally had to start putting up Federal money to help take care of the clerical operations in the local civil defense offices and State capitals. So how long do you think it will be before we start putting up part of the money to provide the guards and the security and the other activities that will be required to see this equipment stays where it belongs and is available for use when needed?

We cannot hope to escape that responsibility permanently, can we?

Mr. PITTMAN. I think the prospects are that the 50–50 matching funds concept will be applied to personnel and administrative cost for civil defense, including this operation.

Mr. THOMAS. This is all Federal funds and always has been.

Mr. PITTMAN. Are you talking about who will calibrate the radiation devices in the monitoring stations?

Mr. JONAS. You are contemplating that the Federal Government would only pay half of that?

Mr. PITTMAN. Half the State personnel and administration costs.

INVENTORY OF MONITORING EQUIPMENT

Mr. OSTERTAG. Mr. Secretary, a moment ago, in response to Mr. Jonas, if I heard you correctly you said you have in being, or in inventory, approximately 50,000 million.

Mr. PITTMAN. 50,000 kits.

Mr. OSTERTAG. Are these the so-called measuring devices and monitoring devices?

Mr. PITTMAN. These are for monitoring purposes.

Mr. OSTERTAG. So that would be an inventory of 50,000, plus the authorization for 1 million more in 1962 and 2 million in 1963?

Mr. ROMM. You are talking about two different items.

Mr. OSTERTAG. That is what I wanted to make clear.

Mr. VISHER. The 50,000 are sets. The CV–777, and this set includes two dosimeters, the 742, one Geiger counter, a CV–700, and it includes two 715's. This kit includes a combination of three different types of instruments which is distinguishable from the dosimeters, which is one type, the 742.

Mr. OSTERTAG. The chairman has pointed out that appropriations have been made available over a period of 5 or 6 years totaling somewhere about $19 million.

Is all that equipment available today in an inventory?

Mr. VISHER. About 96,000 items of radiological equipment have been distributed to the Federal agencies for training and operational purposes; 14,508 high school kits, including 159,588 items, have been furnished. Over 166,000 items have been distributed to the States and localities for training monitors. As of January 1, 1962, 9,064 operational kits, including 54,384 items, had been furnished to the States. We will distribute an additional 41,000 operational kits (including 246,000 items) by July 1, 1962; and 129,000 kits (including 1,548,000 items) by July 1, 1963, on the basis of fiscal year 1963 funds.

Mr. MCKINNEY. There is approximately $9.3 million of the $19 million in stock now and this was reported to the Byrd committee as of January 31, 1962.

Mr. JONAS. Is that the stockpile you want to spend $1,700,000 maintaining?

Mr. MCKINNEY. Yes, plus the additional procurement.

Mr. JONAS. You want to hold it, is that the idea?

Mr. MCKINNEY. No, sir. It is presently being held pending distribution. Most of it will be distributed to the States by September 1, 1962.

Mr. THOMAS. In 24 warehouses?

Mr. MCKINNEY. There is $9.3 million worth of RaDef instruments and $10.2 million of engineering-type equipment, and $2 million of chemical and biological equipment, making a total of $21.5 million.

STATUS OF STOCKPILE

Mr. OSTERTAG. Frankly, I am for this program. I think it is a good idea and a good plan and a good part of the civil defense setup. But for the life of me, I cannot see how so much can be used. It seems to be in a confused state.

You have an inventory. You have a stockpile. Yet, to a certain extent, we are appropriating more money for more instruments and more equipment and I am not sure whether it is going into the stockpile or somewhere else.

Mr. VISHER. Perhaps I can clarify this.

Since taking over in August, we have put a freeze on the stockpile, limiting the amount of equipment that goes out until we have pinned down the total system of combining radiation monitoring points with shelters. It did not make sense to divorce these two elements. The flowout of this stockpile has been held and controlled until we identify the shelter spaces, the buildings which we are identifying, and the radiological equipment will go out to monitoring points, not some place divorced from shelters, but within the stations. Roughly, we estimate the survey will find over 200,000 different shelters located around the country, and with only 50,000 sets, we feel each big shelter, major community shelter, should have the ability to monitor out, to work out, to start decontamination and start going out and helping other people in the area.

RELATION OF STOCKPILE TO SHELTER PROGRAM

Mr. OSTERTAG. This program is to a large extent geared with your shelter program?

Mr. VISHER. This program is very closely related to the shelter program.

Mr. OSTERTAG. Are your requirements to be measured by the degree shelters come into being?

Mr. VISHER. And the first dispersed shelter survey will more than absorb all the equipment we have in the warehouses, plus all we are asking for next year. We are going to have a deficiency of radiological equipment that we are going to have to position. This will force us to make distribution of instruments on a select basis to monitoring points because of this deficiency.

Each shelter will not have a total monitoring capability. We expect only 25 percent of the population will be covered during this first year's survey. If we get a total shelter system, we will be needing radiological equipment on a very broad basis.

Mr. THOMAS. You have $10 million of your $20 million plus expenditures in the warehouse now. Maybe we can get along with that for another year.

STOCKPILE WAREHOUSE OPERATIONS

Turn to maintenance of your stockpile.

You want $1,700,000. What part of this is salaries?

Outside your transportation cost, is it all salaries? It is located in 24 warehouses.

Mr. MCKINNEY. It is by contract to GSA and military departments.

Mr. THOMAS. GSA is your warehouse operator for you?

Mr. MCKINNEY. Yes, plus some supplied by the military departments. It is planned to transfer the entire function to the Defense Supply Agency.

Mr. THOMAS. Where are these 24 warehouses? Your big one is in New Jersey. You have a big one on the Pacific coast. Where are the others?

You have four big warehouses? You have some 20 lesser ones. Read them into the record.

Mr. McKINNEY. All of them?

Mr. THOMAS. What are your four big ones?

Mr. McKINNEY. Sommerville, N.J.

Mr. THOMAS. You have a big one on the Pacific coast.

Mr. McKINNEY. San Jose, or Spokane.

Mr. THOMAS. Where is your third big one? Is it in Philadelphia? I thought you had 4 big ones and they supplied your stock to your 20 small ones.

Mr. JOHNSON. That was the arrangement when we had the medical stockpiling program.

Mr. THOMAS. How are you changing your setup since you transferred your medical stockpiling program to HEW?

Mr. JOHNSON. Each 1 of the 24 points are prime storage points with varying quantities of materials in them.

Mr. THOMAS. Are these in Government warehouses or private?

Mr. JOHNSON. They are all Government, sir; GSA, Army, Navy.

COST OF WAREHOUSE OPERATIONS

Mr. THOMAS. How do you arrive at this figure of $935,000?

Mr. JOHNSON. This is the estimated cost of reimbursement to these departments for warehousing and maintenance services.

Mr. THOMAS. What did you spend in 1960 and 1961 on your warehousing?

The biggest majority of your supplies have been transferred over to HEW and HEW is paying the transportation and warehousing cost? It is not charged to this budget.

Mr. JOHNSON. Our maintenance bill when we had the medical used to run $4 million annually. Now it is down to $1.7 million, including transportation.

Mr. JONAS. $38,000 a warehouse; that is high operational costs.

Mr. THOMAS. What are your figures for the last 5 or 6 years on your warehousing costs? Do you have that available?

Read them into the record, say beginning in 1955. You have been buying this material since 1955?

Mr. JOHNSON. A lot of the medical procurement was not delivered promptly. Deliveries were coming in heavily in later years. I have figures starting with 1956.

Mr. THOMAS. Read them into the record.

Mr. JOHNSON. $1.7 million in 1956; $1.7 million in 1957; $3.1 million in 1958; $13.6 in 1959, which includes reworking of blood plasma; $3.9 million in 1960, and $4.5 million in 1961, in round figures.

Mr. THOMAS. Three-fourths of this has been transferred out of this account to HEW?

Mr. JOHNSON. That is correct, in terms of the dollar value of the stockpile.

Mr. THOMAS. And quantity. How many square feet does this occupy in your warehouses?

TRANSPORTATION COSTS

You give us very little information here. How do you justify this transportation of $500,000? Why not leave the merchandise where it is now?

Mr. VISHER. Square footage occupied in the 24 warehouses is approximately 210,000. The transportation of $500,000 is justified based on taking the additional procurement which we have asked for and moving it and packing it and moving it into the sheltered areas. These warehouses are acting not as stockpiles, but as a point of control and a point of packaging for purposes of moving them into the shelters. We are not holding any large amount of radiological equipment in the warehouses. It is a point for distribution.

Mr. THOMAS. The transportation item is a packaging item?

Mr. VISHER. It is transportation and packaging.

Mr. THOMAS. Most of your hospital equipment is received there and packaged. What about this radiological equipment?

Mr. VISHER. We are presently shipping these to shelters from all 12 warehouses. The radiological equipment is in 12 different places.

Mr. THOMAS. Is this $500,000 specifically applicable to your 1963 procurement program?

Mr. VISHER. Primarily applicable to that procurement program, and 1962 at well. We are buying equipment in order to move it into shelters to answer these problems. This transportation cost is the cost of moving and inspection of this equipment.

Mr. THOMAS. How do you arrive at your figure of $500,000? That is what I do not understand. It includes shipment between warehouses in the event the need arises.

Mr. VISHER. It is an increase of $365,000 over what we are spending this year. We are handling three times the equipment this year as we start moving into shelters.

Mr. THOMAS. If you get the shelters.

Mr. VISHER. And if we get the equipment.

MAINTENANCE OF ENGINEERING STOCKS

Mr. THOMAS. You have maintenance of stocks, $100,000.

What are these units? I have been to all your warehouses. I do not think I have ever seen them.

I have seen two or three old generators sitting out in the open. I doubt if they would run if you wanted to use them. What else do you have?

Mr. VISHER. This is maintaining it.

Mr. THOMAS. How are you maintaining it for $100,000?

Mr. VISHER. Part of this cost——

Mr. THOMAS. What is this 45 10-mile units of emergency engineering stockpiling?

Mr. VISHER. Primarily a water system which includes pumps, generators, 10 miles of pipe, and water purification equipment.

Mr. THOMAS. What are you doing to it?

Mr. VISHER. We are having it stored in the warehouses to be available in an emergency.

USE OF ENGINEERING STOCKS

Mr. THOMAS. You are taking it from the open and putting it in a warehouse and spending $100,000. Where are you going to transport it after you get it in the warehouse?

Mr. VISHER. These have been used in time of emergency like Hurricane Donna in September 1960. There have been several requests for emergency water supplies. We have brought them out of the warehouse for that purpose.

Mr. THOMAS. Where have you used them?

Mr. VISHER. One in Illinois quite recently. There was a water system in need of support.

Mr. THOMAS. On the basis of some emergency?

Mr. VISHER. On the basis of an emergency and a training exercise.

Mr. THOMAS. Emergency is one thing and a training exercise is something else. Was this a training exercise?

Mr. VISHER. Training exercise.

Mr. THOMAS. Just like you would use some of your hospital equipment for training exercises?

Mr. VISHER. That does not get into hospital equipment.

DIVISION OF STOCKPILING RESPONSIBILITIES

Mr. OSTERTAG. Is it not true that the Executive Order divided the stockpiling responsibilities among a number of agencies?

Mr. THOMAS. Medical supplies goes over to HEW.

Mr. OSTERTAG. Other than that, you have the entire responsibility?

Mr. PITTMAN. Correct; except that food was assigned to Agriculture.

MAINTENANCE PROCEDURE

Mr. JONAS. Let me ask a question. How often do you oil this pipe? Do you ever run into any rust problem?

I used to store a few little things in my grandfather's barn and I found they would all rust. Do you go in there and rotate this pipe and keep the joints oiled?

Mr. PITTMAN. I do not know the procedure, but I want to make it clear that this entire problem is being placed in the hands of the new Defense Supply Agency, using the facilities of the Defense Department for this and similar problems.

We will be following procedures employed by the Defense Department for comparable purposes, rather than procedures of the past.

What changes this will involve in detail, I do not know, but it will be a different system of handling the maintenance, transportation, and the logistic problems.

Mr. THOMAS. The hearing will adjourn until tomorrow at 10.

WEDNESDAY, MARCH 14, 1962.

Mr. THOMAS. The committee will please come to order.

COMPLETION AND TOTAL COST OF "NEAR" SYSTEM

Before we go into emergency operations, I want succinctly in the record at one place under "Alert warning" your $25 million for NEAR. First, how long will it take to complete this entire installation? Who can answer?

Mr. PITTMAN. We estimate the installation will be completed in fiscal year 1965, but the bulk of it will be installed in fiscal year 1964.

Mr. THOMAS. What will be the total cost by 1965?

Mr. PITTMAN. We estimate $500 million total cost to the Nation, not the Federal cost.

Mr. THOMAS. What will be the total cost to the Federal Treasury?

Mr. VISHER. The generator cost is $100 million.

Mr. THOMAS. Is that the total cost to the Federal Treasury?

Mr. PITTMAN. $110 million.

Tr. THOMAS. $110 million will cover the total cost to the Treasury?

Mr. PITTMAN. That is our present plan.

Mr. THOMAS. Does that include the sets?

Mr. PITTMAN. It does not include the sets.

Mr. THOMAS. The round figure, the $400 million additional, will be paid by the public and not the Treasury?

Mr. PITTMAN. The public or the utilities.

Mr. THOMAS. You cannot expect the utilities——

Mr. PITTMAN. This is a subject we are exploring.

Mr. THOMAS. A safer assumption is it will cost the Treasury at least $250 to $350 million, will it not?

Mr. PITTMAN. We do not have a basis for that estimate at this time. On the present plan, the Federal cost would be $110 million. Only if we were forced into the purchase of receivers for installation in homes would it be much higher.

Mr. THOMAS. What do you think the unit cost will be for each box?

Mr. PITTMAN. The manufacturer's cost would be $5 to $7, and the retail cost would be $10 to $15 under present estimates.

EMERGENCY OPERATIONS

Mr. THOMAS. We will insert page 17 in the record.

(The page referred to follows:)

Emergency operations program summary

	1961 actual	1962 estimate	1963 estimate
Communication and control		$5,523,000	$10,100,000
Damage assessment		1,000,000	2,500,000
Survival services		1,522,000	
Training, education, and public information		14,477,109	20,885,000
Total obligations		22,522,109	33,485,000

NATIONAL COMMUNICATIONS SYSTEM

Mr. THOMAS. We will go to the emergency operation program, communication and control.

Did you have any cost figures on this for 1960 and 1961?

Mr. VISHER. We have broken the item down by systems.

We have a NACOM–1 system. In 1958, we had a recurring cost of $273,000; in 1959, we had $315,000; in 1960, we had $374,000.

Mr. THOMAS. What does this new item do that has not been done under the old program? You do not give us much justification. You do not give us much reading matter on it.

Mr. VISHER. The basic addition over the continuation——

Mr. THOMAS. Just what is this item?

Mr. VISHER. This item provides a communication system for the Federal Government to communicate to the regions and to the States in a civil defense environment.

Mr. THOMAS. You have that now. You have a system now beginning with two or three of your alert systems in Denver out to your State headquarters and perhaps to your regional offices. What is this doing that you are not already doing?

Mr. VISHER. You refer to the warning net, the warning net we discussed yesterday which has 500 points. Here we push a button and get a result in 500 different places. We also have a communication net, a voice and record communication net, which we call NACOM–1. This is the recurring cost that I have just listed.

We have a backup to the NACOM–1 which is a radio network. This is called NACOM–2. So there is NACOM–1 which is a voice link by wireline and NACOM–2 which is a voice link going over radio, and NAWAS which is a warning system.

NEED FOR BACKUP SYSTEM

Mr. THOMAS. This is just a duplication and backup of the one you have now. Is that an accurate statement?

Mr. VISHER. The NACOM–2 is a backup to NACOM–1 for added reliability.

Mr. THOMAS. Why do you need this?

Mr. VISHER. Because of possible failures of the NACOM–1 system. In the blowing up of the towers in Nevada, the system was off the air for approximately an hour. A radio link would prevent that kind of delay occurring.

Mr. THOMAS. Is this by wire or by radio now?

Mr. VISHER. The NACOM–1 is by wire.

Mr. THOMAS. That is the one in existence now?

Mr. VISHER. That is in existence now. We are leasing from the A.T. & T.

Mr. THOMAS. What is that?

Mr. VISHER. That is the system that is costing us about $625,000 a year to lease from the phone company.

It has gone from $273,000 to $625,000.

Mr. THOMAS. It is going up all the time. Is this radio?

Mr. VISHER. That is rental of wirelines from the phone company.

Mr. THOMAS. We are through with that now.

NATURE AND OPERATION OF NACOM–2 SYSTEM

What about the new item. Is it radio?

Mr. VISHER. The NACOM–2 is a radio link that the committee has approved various elements of in the last year.

Mr. THOMAS. Is this $10,100,000 going to be the end of the cost?

Mr. VISHER. No. I am going through the elements.

The large new element in radio communication is to provide fallout protection and standby generators in radio broadcast communication systems. This is to reach the public. So the large new element in

this program is the addition of protection of the AM broadcast stations at about $10,000 a station to insure they will be able to operate in time of a nuclear attack.

RECURRING AND NONRECURRING COMMUNICATIONS COSTS

Mr. THOMAS. What makes up the $10,100,000 that you show for communication and control?

Mr. VISHER. $6.3 million of that $10 million is in that activity.

Mr. THOMAS. And $3.1 million is your recurring cost?

Mr. VISHER. Yes.

Mr. THOMAS. What are you going to spend your $6.6 for and your $3.1 million for? What are your recurring costs, and what will be your initial outlay here?

Mr. VISHER. The recurring cost on the NACOM–1 is $625,000.

As you see, we are going down from the 1962 figure.

The recurring cost on the NAWAS net, this year we are spending $1,420,000, for recurring costs and then we are expanding that network from 450 to 500 points.

We have $177,000 for this expansion. We anticipate the recurring cost, that is, the leasing of the NAWAS from the phone system will be $1.6 million in 1963. So these two elements are the basic combination of the service we are leasing from the phone company.

Mr. THOMAS. That makes up your $3.1 million?

Mr. VISHER. Yes, for the most part.

Mr. THOMAS. That will be approximately the same each year?

Mr. VISHER. That is correct.

Mr. THOMAS. How are you going to spend the money on the radio stations?

Mr. VISHER. We have approximately 600 to 700 radio stations.

Mr. THOMAS. $10,000 each?

Mr. VISHER. Of that order.

Mr. THOMAS. What are you going to get for your $10,000?

Mr. VISHER. Fallout protection, which is protection for the personnel who are in the radio station and have to be there to operate it, plus we are going to get standby power capacity for those stations which need standby power. Approximately 22 percent of the stations already have auxiliary power for emergency.

Mr. THOMAS. Break down that $6.3 million between fallout protection and facilities.

Mr. VISHER. We expect to spend about $3,000 to $4,000 for fallout protection, and between $6,000 and $7,000 per station for the protection of the power system. This is in 1963.

SQUARE FOOT COST OF FALLOUT PROTECTION IN RADIO STATIONS

Mr. THOMAS. Break down your construction cost on a square foot basis. What will it be to get these stations in condition?

Mr. VISHER. These stations will have approximately 200 to 300 square feet protected area. We have asked the Corps of Engineers to make a survey of the various stations. We have asked the Federal Communication Commission to list those stations which they want to have in the emergency broadcast plan, and it will vary from station to station. If it is an all brick building, the cost will be less. If it is a wood building, we will have to go to higher costs.

Mr. THOMAS. What are some figures to indicate the range in cost?

Mr. VISHER. On the order of $15 or $20 on these smaller sized units per square foot to incorporate the protection.

Mr. THOMAS. It did not cost that to construct most of the buildings, did it?

Mr. VISHER. $15 to $20 a square foot is the basic cost for modification.

If you are adding new construction in small units into a one-story building not designed for protection, this $15 figure is a reasonable figure.

Mr. THOMAS. You allow about $4 a square foot in the contribution stage. Here you are coming up with a $20 figure.

Mr. VISHER. That is an incremental cost. We are talking about protecting 10 people in a broadcast station. We are talking about protecting 50 or more in the larger incentive programs.

Mr. THOMAS. Why the difference?

Mr. VISHER. The difference is you do not have that many people at most of these broadcast stations. Most of these stations operate between three, five, or seven people, depending on the station. Many of these are fairly automated.

Mr. THOMAS. I do not understand why you spend $20 a square foot to protect 5 or 7 people, and $2.50 per square foot to protect 200 or 500.

Mr. VISHER. We are spending the larger amount of money because they are in remote areas, in small buildings, one-story buildings, and the job does not protect those people.

Mr. THOMAS. I know some of your biggest ones are not in remote areas. In the District of Columbia, it is right downtown in your big hotel.

Mr. VISHER. The transmitter stations are normally in the rural areas.

Mr. THOMAS. Is this to protect the transmitters or the station?

Mr. VISHER. To protect the handful of people in the station.

Mr. THOMAS. What does the transmitter have to do with it?

Mr. VISHER. It keeps the transmitter operating.

Mr. THOMAS. You are going to have to have people stationed to protect the transmitter?

Mr. VISHER. We are going to have to have people to keep the transmitter operating. This varies from 3 to 10 people in the larger transmitter stations which are normal maintenance personnel, including the normal operating engineer.

EMERGENCY POWER GENERATOR

Mr. THOMAS. That is one facet of your $6 million. How much do you allocate for this remodification of your buildings?

Mr. VISHER. That is approximately a third of the cost.

Mr. THOMAS. What about your transmitters?

Mr. VISHER. The transmitters themselves need to have two elements to operate:

One, they need to have a reliable power system. Eighty percent of the stations of the country do not now have auxiliary power.

Mr. THOMAS. That is for your 600 to 700 stations. What is your auxiliary power going to cost you per station?

Mr. VISHER. We have it going on small stations; $4,000 to $10,000 for large stations. An average of $6,700.

Mr. THOMAS. By the time you pay for your construction and your auxiliary power for 600 or 700 stations; what will that be per station?

Mr. VISHER. About $10,000 per station.

Mr. THOMAS. Are the local stations making any contribution, or is this 100-percent Government contribution?

Mr. VISHER. This particular program is 100 percent Government contribution. They are providing the transmitters.

Mr. THOMAS. You say 100 percent?

Mr. VISHER. They are providing the space and the transmitters. The elements we are talking about, the fallout protection and the auxiliary power, is the Government contribution.

Mr. THOMAS. That is exactly what I asked you.

Mr. PITTMAN. The answer is "Yes." But the point is that there is a contribution being made by the broadcasting companies for the emergency capability.

Mr. THOMAS. This is a Government monopoly. You are operating by virtue of a certificate of convenience and necessity.

USE OF STATIONS

Mr. JONAS. Since you are spending that much money building these shelters and providing this power, why do you not use that as your primary communicating link and cut out the telephone cost of $625,000 a year?

Mr. VISHER. The AM broadcast band, which is the group we are talking about, the radio stations we listen to at 640, and 1240, these stations are not normally available to use to talk to regions, to talk to people on a warning basis. We need the basic communication link to talk and disseminate warning, disseminate vital information. It is not quite the same kind of link. One goes to every person via his radio, one goes to a specific point for use in time of emergency, and for normal operation of a system. It provides two-way communication as contrasted to the one-way communication provided by the AM system.

COMMUNICATION AND CONTROL JUSTIFICATION

Mr. THOMAS. We will insert pages 18 through 22 in the record.

(The pages referred to follow:)

COMMUNICATION AND CONTROL, $10,100,000

Vitally important to the total nonmilitary defense efforts are efficient and reliable communications and warning systems. Adequate and timely warning will enhance the value of mass shelters. Communications networks must be planned and established prior to an emergency if a command and control capability is to exist both during and after attack.

This project includes recurring costs: leased circuits and terminal equipment, and maintenance charges; and nonrecurring costs: extension of existing facilities, and improvement of their flexibility and reliability.

It is expected that an assignment will be made to the Defense Communications Agency whereby it will assume responsibility for operation of these systems, integrating them with military systems to the extent deemed desirable after careful surveys. Based upon discussions with DCA, the systems will be operated on a reimbursable basis. Therefore, funds requested for fiscal year 1963 for existing systems have been limited to recurring costs only.

(a) Recurring communications costs, $3,155,000

National Communications System No. 1 (NACOM No. 1).—This system is designed to be the backbone of OCD–DOD's requirement for a command and control network, reasonably secure from attack effects, by means of which postattack operations for survival can be coordinated, directed, and assisted.

NACOM 1 is a leased teletypewriter-telephone system. It serves as the operational network connecting OCD–DOD national and regional headquarters, the operating headquarters of the States and the District of Columbia. Its major function is to furnish OCD–DOD with the medium through which it can coordinate, in an emergency, nonmilitary defense efforts down to State level and, through interconnection with other Government communications systems, to the emergency relocation sites, of selected Government agencies. During fiscal year 1962, the Federal portion of NACOM 1 was maintained on a full-period or around-the-clock basis. Such an arrangement not only insures a communications capability which is fully ready at all times, but it also provides a facility for realistic training and a reliable and economical means of handling command and control traffic. The regions-to-States circuits remain on a standby status. These latter, which are engineered military circuits, can be operational in as little time as 1 hour in an emergency.

Funds requested for fiscal year 1963 will be sufficient to maintain the system as presently constituted.

Breakdown of funds:

Interstate charges	$550,000
Terminal equipment rental	60,000
TWX	15,000
Total	625,000

National communications system No. 2 (Nacom 2).—All systems of communication employing primarily wireline networks and their related switching centers are vulnerable to major disruption under nuclear attack. It is essential that these facilities be supplemented by a point-to-point radio backup system to assure that minimum emergency communications can be maintained pending restoration of the wireline system. Nacom 2 was the outgrowth of this requirement.

During fiscal year 1962, installations were completed in all regions but 2 and 4; at the headquarters in Battle Creek, Mich.; and at the former OCDM facility, the classified location. Installation of equipment was also made in 19 States and Puerto Rico, and interim equipment was placed at regions 2 and 4.

Also during fiscal year 1962, additional spare parts and test equipment were purchased; the proper equipment to complete region 2 installation was procured; and teleprinters for operational State terminals were leased.

In fiscal year 1963, the funds requested will be utilized to provide maintenance for the system, and to continue radio backup to warning centers. Total, $573,000.

National warning system (Nawas).—Adequate warning of enemy attack effects is the key to survival. To discharge this responsibility to warn the civilian population the Government has established an extensive and reliable nationwide attack warning system (Nawas). Nawas is composed of two separate voice circuits leased from the A.T. & T. Co. The warning circuit connects all OCD warning centers with 450 strategically located State and local warning points and 50 Federal Government warning points for rapid dissemination of attack warning and supplemental attack effects. From these stations an alarm is transmitted to local governments and by sirens and internal alarm devices to the people at large. (The national alarm repeater system (NEAR) is discussed on p. 10.) The alarm is also supplemented by verbal instructions over broadcasting stations. (See p. 21.) The control circuit joins only OCD installations, and is used for the rapid exchange of tactical warning information and command control purposes. Nawas is kept operational on an around-the-clock wartime basis. Total, $1,650,000.

Radio equipment maintenance.—In steps taken to improve communication to the public, during fiscal year 1962 radio equipment was installed in selected radio stations throughout the Nation by means of which the stations' transmitters can be remotely programed from a protected civil defense control center. Proper maintenance of this equipment is vital. Funds requested for fiscal year 1963 will provide a minimum capability for such maintenance. Total, $75,000.

Washington, D.C., metropolitan area warning system.—As the seat of the Federal Government, Washington must have an effective warning system. Such a system was developed and installed, and is now fully operational.

The Washington area warning system, by means of sirens placed in advantageous locations, provides outdoor audible warning coverage for the Washington metropolitan area. In addition to the siren control circuits, an information area warning-command and control operational circuit is installed to serve all civil defense headquarters and certain military bases in the metropolitan area. This consists of a wireline circuit backed up by a radio network.

Funds requested for fiscal year 1963 include only the recurring costs of circuit rental and necessary maintenance.

Breakdown of funds:	
Command and control circuits	$86,000
Maintenance and spare parts	116,000
Total	202,000

Test exercises.—During test exercises, certain communication facilities are added to the normal communications systems to expand the play of the exercise and to enhance training in the communications processes. Total, $30,000.

(*b*) *Protection of broadcast stations, $6,360,000*

Public Law 920 calls for adequate communication to the public of emergency information and instructions. The medium combining the greatest coverage of the Nation's population with the least amount of delicate and/or cumbersome receiving equipment is standard AM radio. A program was initiated in fiscal year 1962, therefore, to equip selected stations with those items needed to provide a continuing capability to broadcast in an emergency. These are (1) direct access to warning information by means of a NAWAS drop at the station; (2) an emergency power generator; and (3) a fallout-protected area at the transmitter location for engineering and maintenance personnel. During fiscal year 1962 some 50 stations will be equipped with these protective features. The ultimate goal of this program is to select a sufficient number of stations to receive this assistance so that the Nation's entire population is within range of one or more operational, protected transmitters.

Funds requested for fiscal year 1963 will complete about 900 additional stations. By the end of the fiscal year, over 20 percent of the Nation's 4,500 AM radio broadcasting stations will have become part of this improved system for reaching the public.

(*c*) *Radio communications with broadcast stations, $585,000*

As part of the total project of improving radio communication to the public, there must exist reliable programing circuits between the transmitter locations of the stations selected under the program described in (*b*) above, and protected civil defense control centers.

In fiscal year 1962, therefore, radio circuits were established to those stations selected for emergency power and other Federal aid. This program is scheduled to continue in fiscal year 1963. Funds requested will equip 130 additional stations with radio link equipment.

As funds become available in subsequent fiscal years, additional radio circuits will be established, supplanting or providing backup to wirelines.

DAMAGE ASSESSMENT

Mr. THOMAS. Let's look at damage assessment. Mr. Reporter put pages 23 and 24 in the record.

(The pages referred to follow:)

DAMAGE ASSESSMENT, $2,500,000

In fiscal year 1962, precise data are being collected to provide exact geographical locations of approved community shelters which will be marked and stocked. These data are essential to permit accurate studies of probable casualties which would result from hypothetical attacks, which might be possible during the next several years. Such studies are necessary in order to evaluate the progress of our shelter program, as well as improve and revise all civil defense operational plans and existing programs and to develop and test new approaches to these problems. A start was made to obtain up-to-date information on location and quantities of survival supplies; e.g., food, medicinals, clothing, utilities, and other survival essentials. These data are necessary to carry out our responsibility of assuring survival of the postattack population.

In fiscal year 1963, major effort will continue to be devoted to improving the data base for inventorying and studying resources which will affect emergency survival operations and postattack rehabilitation actions. Major effort will be directed to accumulation and analysis of data regarding amount and location of existing resources; determination of probable resources shortages and dislocations under varying attack conditions; and development of improved methods of postattack utilization and conservation of assets to support survival operations and rehabilitation measures.

Emphasis will be directed to a fact-gathering and survey effort. Much information is yet incomplete and, in some cases, based upon unproved mathematical estimates. This work will be performed by the OCD staff with the assistance of other Federal agencies, and where practical, by outside contracts. The activities to be supported by these data will include determination of capabilities of survival assets; assessment of these supplies under a variety of assumed attack conditions, including potential vulnerability to direct or indirect weapons effects; and appropriate measures to correct the most important deficiencies.

Factors to be considered in these studies are: Resources expected to be available at a given time; impact of varying attack patterns upon the availability of these resources; availabiiity of distribution facilities under different attack patterns; impact of possible postattack population relocations; and availability of trained personnel and facilities to make use of surviving supplies.

Computer support is a critical element in the success of the fiscal year 1963 program and will continue to be required for reasons as follows: To perform the vulnerability studies and damage assessment function assigned to the Secretary of Defense by Executive Order 10952; to support emergency survival operations and postattack rehabilitation activities; to accomplish preattack survival requirements and availability studies under various attack conditions; and to make preattack studies of survival supplies, distribution, and transportation facilities likely to survive under different attack patterns.

If our program is to be a successful and balanced program of inducing shelter construction by State, local, and private sectors of the Nation, we must have a rapid, large-capacity electronic computer system to maintain current records of shelter space in being and in process. By using such a computer, we can accurately and quickly determine the remaining shelter requirement for any geographic location and thereby assure that additional shelter is provided only where needed; to make studies which support other program areas; e.g. selecting and training management for each community shelter in the Nation. Anything less than a rapid, accurate response to shelter applicants, State and local governments, or private nonprofit enterprise, will be detrimental to the shelter program.

All these requirements must be met by a large-scale electronic computer capability. These services can be obtained on a reimbursable basis from existing computer installations, e.g. National Resources Evaluation Center, and Ordnance Industrial Data Agency. The data gathering and computer support operations are estimated to amount to $2.5 million in fiscal year 1963.

EXPENDITURES FOR DAMAGE ASSESSMENT

Mr. THOMAS. What did you spend on damage assessment in 1960 and 1961?

Mr. ROMM. We cannot identify what portion of the OCDM budget was spent for damage assessment in 1960 and 1961.

Mr. THOMAS. You and your distinguished staff have been in business for about 6 months. Did you review what has been done for the last 11 years? Are you familiar with this?

Mr. ROMM. I am familiar with what they have done, but I do not know what it cost them.

Mr. THOMAS. What have they done?

OPERATION OF DAMAGE ASSESSMENT PROGRAM

Mr. ROMM. Most of their effort in the past has been directed at resource management problems, production recovery problems, heavy industry problems. They have a tremendous amount of information on their tapes on population which is helpful to us. But most of the 500,000 points they have relate to industrial capability.

Mr. THOMAS. What are you going to cover they have not already covered for 10 years?

Mr. ROMM. Let me tell you how we are spending our $1 million in fiscal year 1962.

All of our contracts are with Federal agencies. We have a contract with the HEW to identify and specifically locate every school, elementary and secordary, in the country by specific geographic location, together with date on what the schools are capable of doing, data on their construction, how many students they have, et cetera.

Mr. THOMAS. You have had these agency efforts for 8 or 10 years. They have always had a little money of their own.

At one time it was appropriated to them. The next time it was appropriated to you and earmarked for their benefit. As far as this year is concerned, they have a budget of their own, yet you come in here with an item of $2.5 million.

Mr. ROMM. Mr. Thomas, these items were never covered by the agency activities.

Mr. THOMAS. Just what items are covered?

Mr. ROMM. These items cover the collection of data and the improvement of existing data, or the making available of these data for computer purposes that are useful and necessary.

COMMODITIES AND RESOURCES SURVEYED

Mr. THOMAS. Assets of each community, how much clothing?

What transportation is available?

Mr. ROMM. We are covering food supplies, health supplies, health manpower. I have a series of examples which I will submit for the record.

(The information referred to follows:)

Fiscal year 1962 damage assessment program, obligations and commitments, as of Mar. 14, 1962

Project	Contracting agency	Amount
(a) Data base improvement:		
Water supply systems	Department of Health, Education, and Welfare.	$70,000
Wholesale food supplies	Department of Agriculture	50,000
Consumer food supply sample	do	40,000
Health manpower	Department of Health, Education, and Welfare.	90,000
Local health facilities	do	5,000
Elementary and secondary schools	do	195,000
Petroleum storage (capacity less than 25,000 barrels).	Department of the Interior	120,000
Solid fuels (card punching of available data).	do	3,100
Repair stocks for electric power companies.	do	2,500
Completion of 1960 census tabulation to damage assessment input.	Census Bureau	12,600
Location code mapping and publication.	do	50,900
Home shelter construction sample	do	30,000
Daytime population sample	do	60,000
Population mapping	do	6,000
(b) Machine computation:		
1,000 hours of computation time at $250 per hour for 4-month period March through June 1962.	Ordnance Industrial Data Agency	250,000
Total		985,100
Appropriated, fiscal year 1962		1,000,000

Mr. THOMAS. You mean to tell me that this information is going to be valid in 60 or 90 days after it is collected?

Mr. ROMM. Yes, sir.

Mr. THOMAS. These are all consumer supplies; you are not mentioning the railroads. After an attack the railroads will be there. Perhaps the trucks and buses will not. The groceries will not be there. The blankets will not be there. The medical supplies will not be there. The probabilities are they will not.

Mr. ROMM. I think if you checked the retail and wholesale stock levels across the country, the likelihood is they will be.

NECESSITY FOR INFORMATION AT LOCAL LEVEL

Mr. THOMAS. You put your finger on it. You can go over to the Department of Commerce, or over to the Federal Reserve Bank Board and see what the sales were 60 days ago compared with what they were 90 days ago and you have the answer.

Mr. ROMM. You have the answer on a national basis, but we do not have an answer in specific geographic detail.

Mr. THOMAS. All these Federal Reserve districts can pretty well give it to you for their districts. How many are there?

Mr. ROMM. Twelve.

Mr. THOMAS. Will not each one give it to you for their district?

Mr. ROMM. I submit that you have to find out what is available at the local level. Knowing what is available in the district will not help the local capability very much.

Mr. PITTMAN. The whole purpose of this is to analyze the results of explosions that take place at various localities around the country.

Mr. THOMAS. Off the record.
(Off the record.)

SCOPE AND DURATION OF DAMAGE ASSESSMENT PROGRAM

Mr. OSTERTAG. Are we to understand this is a continuing program, one that is going to go on indefinitely?

This, as I understand it, is damage assessment, evaluating and determining the damage aspects to the whole application in case of an attack.

Mr. ROMM. Yes, sir.

Mr. OSTERTAG. Is it going to cost $2.5 million every year to just continue this assessment?

Mr. ROMM. No, sir. We found when we were assigned this job that there were not any data available providing information useful for survival planning at the local level. Most of the $1 million appropriated in fiscal year 1962 is being spent to collect such data, and about half of the money we propose for 1963 will be used to collect and improve on additional data.

Once the data are available, it is a lot cheaper proposition to keep it up to date.

The recurring costs in this program will be computer costs.

Mr. OSTERTAG. What do you estimate that will be?

Mr. ROMM. For next year, we estimate it will be $1.25 million.

Mr. OSTERTAG. That will be a leveling-off responsibility in the way of recurring costs?

Mr. ROMM. No; this is for computer operations, a continuing need for damage assessments and preattack studies.

Mr. OSTERTAG. Is that all that is left of it after you complete this job, a computer operation?

Mr. ROMM. And continuing updating of the data which will not be anywhere near as expensive as it is this year and proposed for next year.

TRAINING, EDUCATION, AND PUBLIC INFORMATION

Mr. THOMAS. We will insert pages 25, 26, 27, 29, and 32 in the record.
(The pages referred to follow:)

TRAINING, EDUCATION, AND PUBLIC INFORMATION, $20,885,000

A vigorous nationwide civil defense program will require an equally vigorous, imaginative, centrally directed and coordinated training, education, and public information program. Training and education activities support, and reflect the scope and emphasis of, OCD program objectives and national civil defense plans, concentrating primarily upon the shelter program. Public information activities explain the civil defense program to the individual citizen.

The hard-core civil defense training effort will be conducted within the OCD schools. These schools will concentrate on courses for specialists, such as instructors and key community leaders with civil defense responsibilities. Instruction will be responsive to civil defense operations requirements with emphasis upon planning for, and implementation of, an effective shelter program.

Additional assistance will be provided to States and communities so that they may carry on necessary additional training. Primarily, this will involve the preparation of self-contained training packages for use by the local community in conducting required skills training. New approaches and techniques will be utilized in preparing training materials, including the use of these packaged training materials in the Nation's colleges and universities.

Emphasis will be placed on an enlarged public education effort which will teach the individual citizen about the effects of nuclear weapons, shelter, and the measures he must take for his own, his family's, and his community's survival. Such public education is essential because an effective civil defense requires that each citizen understand his role and responsibility to support actively the community effort.

An extensive public information program required to make the national civil defense effort a public program in the broadest sense of the term will use the established media of public communications to interpret civil defense program objectives and plans to the citizens so that they will understand and support civil defense.

Major programs which contribute to the overall training, education, and public information objectives follow, together with cost estimates:

(*a*) *OCD schools, $850,000*

Emphasis in OCD schools will be placed on instruction for instructors and individuals who have key civil defense responsibilities. Courses in all four OCD schools have been standardized and instruction will emphasize the planning for, and implementation of, the shelter program at the community level.

OCD school instruction will not provide courses for general public education or orientation, which is the responsibility of the local community and must necessarily be conducted at that level.

Program costs

Student expense	$300,000
School operating costs	500,000
Training supplies and equipment	50,000
Total	850,000

(*b*) *Training analysis and instructional support, $5,850,000*

Increased activity in this area is required to support increased emphasis being placed upon civil defense instruction for general use, preparation of packaged training materials for use at all levels of government, and development of new approaches and techniques for civil defense training.

While OCD schools will concentrate upon the hard-core training of key leaders, this does not begin to meet the total civil defense training requirement. States and localities, with the assistance of OCD, are responsible for providing the skills training necessary for an operational capability under emergency condition, including all aspects of the shelter program. OCD assists States and communities in this training effort through a variety of means. One of these is reimbursement to States and communities of half of the costs of conducting training courses and exercises. Funds for this purpose have been included under the financial assistance portion of this budget. Additionally, assistance is given to local communities through such activities as the courses to prepare architects and engineers to perform shelter surveys in their communities and high-level seminars in such areas as police and fire. Primarily, however, assistance is given to States and localities through the preparation and distribution of standardized training materials.

This training analysis and instructional support activity also will provide for analysis needed to identify training needs, development of plans and programs, coordination and quality control of these training activities, and systematic reporting and evaluation of training effectiveness.

Program Costs

Costs of services and materials for development of training packages and publications, including instructor and student materials; films, filmstrips, and other audio-visual aids; training exercises and tests	$2,500,000
Printing and reproduction of training package materials developed for OCD training and education purposes	2,600,000
Contracts for curriculum development and evaluation	350,000
Development of special instructional packages for television	400,000
Total	5,850,000

(*c*) *Public education, $9,347,000*

Primary public education effort has been through the civil defense adult education program (CDAEP), which was initiated in fiscal year 1959. The CDAEP is designed to provide an orderly process for educating the general public on the effects of modern weapons and the civil defense measures to be taken by individuals, families, and communities. Established educational channels and

resources are used to accomplish the program objectives, which directly support the OCD shelter program.

The Office of Civil Defense provides direction, coordination, course materials, technical information, and budgetary support. With this OCD direction the U.S. Office of Education administers and supervises the adult education program.

The U.S. Office of Education has a small administrative staff which negotiates contracts with States to use their existing adult education network to present a course, "Personal Preparedness in the Nuclear Age." This course covers the effects of conventional, nuclear, chemical, and biological warfare, and measures which offer protection against these effects. The planning and preparation by Federal, State, and local Governments are explained. The relationship of the individual citizen to the total civil defense effort is emphasized to give him an understanding of his role and responsibility. Instruction about shelters of various types and their use, including emergency equipment and supplies and radiological decontamination, is included.

Coordinators and State instructors of each participating State receive initial training in seminars conducted at OCD schools. This is essential because the State instructors in turn conduct instructor training sessions in which local teachers are prepared to teach the citizens of their communities. This procedure helps guarantee standardized instruction by responsible, trained teachers throughout the participating States. Provision is being made through contract for revision and updating of instructor and student materials used in this program. This will further help guarantee standardized instruction consonant with OCD program objectives. In fiscal year 1960, approximately 40,000 adults completed the 12-hour course in 4 participating States. In fiscal year 1961, the number completing the course in 7 participating States was approximately 100,000. An estimated 550,000 adults in the 15 States currently participating and in the States being added in the next few months will complete the course during fiscal year 1962. Extension of the program to a total of 35 States is planned to be achieved by June 30, 1962. In fiscal year 1963, the program will be extended to include all 50 States, and it is estimated that 2,500,000 adults will complete the course during that year.

Program Costs

Adult Education Program:	
Administrative Costs—Office of Education	$185,000
State Contracts	5,000,000
Audio-Visual Materials	1,426,000
Printed Materials and Publications	2,236,000
Distribution of Materials	175,000
Technical Publications	325,000
Total	$9,347,000

(d) Public information, $4,838,000

The public information program of the OCD is designed to reach a variety of levels of the general public. For example, the pamphlet, "Fallout Protection," made available in January and February 1962, was directed to every citizen. It will be followed by a manual on family shelter design directed at homeowners. In addition, technical manuals covering design of community shelters in schools and hospitals will be issued for use by professional architects and engineers. Other material will be made available to industry, national organizations, and civic groups as guidance for their participation in the national civil defense effort, particularly at the local community level.

Public information activities will use various media and techniques to disseminate appropriate information on civil defense programs and activities to the Nation. Civil defense plans and program at the National, State, and local levels will be interpreted to the public so that the public can understand and support these civil defense activities. Primary emphasis will be upon developing understanding and support for the shelter program.

Two kinds of programing will be undertaken to assist OCD in achieving its broad objectives: programs to interpret and explain the roles and responsibilities of OCD in the civil defense effort; and programs designed to support specifically the civil defense efforts of State and local governments.

Informational and promotional printed material will include new publications on such subjects as the national shelter survey, cooperative neighborhood shelter projects, and fallout shelter supply. Necessary revision and reprint of present publications will be made. Technical guides, bulletins, and manuals will be prepared on various aspects of civil defense such as shelter design, the NEAR system and communications for use by special groups such as architects, engineers, and other professionals. Filmstrip kits relating to various civil defense subjects will be produced for briefing purposes. These will be distributed to national organizations, educational institutions, and civic groups.

Program costs

Audiovisual productions	$1,138,600
Informational and promotional printed material	2,221,000
Technical publications	377,000
Filmstrip kits	207,800
Exhibits and adaptations	275,400
Contractual artwork, printing, and briefing supplies	290,200
Transportation of things	328,000
Total	4,838,000

PREVIOUS APPROPRIATIONS FOR EDUCATION AND INFORMATION

Mr. THOMAS. Education and training and public information, $20,885,000.

What did we spend on this program in 1960 and 1961?

Mr. DURKEE. In 1960, on that entire program of training and education and public education, the total was $3,295,000.

Mr. THOMAS. 1960 or 1961?

Mr. DURKEE. 1960.

Mr. THOMAS. What was it in 1961?

Mr. DURKEE. $3,474,000.

Mr. THOMAS. And 1962?

Mr. DURKEE. 1962 will be $7,674,000.

Mr. THOMAS. This year you want to jump it up 200 percent?

Mr. DURKEE. Yes.

Mr. THOMAS. What are you going to do that you have not done before? If the people are not aware of what is going on, how are you going to make them more aware?

We have been talking to them for 10 or 11 years. Every news media has been used; television, radio, and newspapers. It has been good copy for the Government Printing Office.

Mr. JONAS. Even Jack Paar is in the act.

FALLOUT PROTECTION PAMPHLETS

Mr. THOMAS. We sent out how many pamphlets on the fallout shelter? How many million? I notice we have 3 million left.

Mr. PITTMAN. Thirty-five million.

Mr. THOMAS. What did that cost us?

Mr. PITTMAN. Just over $1.5 million.

Mr. THOMAS. That was a herculean job for $1.5 million.

Mr. PITTMAN. That is the printing and distribution cost. I would like Mr. Durkee to explain the emphasis of this program, and how it differs from the past, because I think it is fundamental.

Mr. THOMAS. Let's get started on it. It is nothing new with us.

CIVIL DEFENSE SCHOOLS

Mr. DURKEE. Let me start with the schools, which is the first item on the list.

The school system, when we took it over, taught 44 different courses.

Mr. THOMAS. How many schools are there?

Mr. DURKEE. There are four schools.

Mr. THOMAS. How long have we had them?

Mr. DURKEE. We have had them for several years. They taught 44 different courses. They claimed numbers of people trained, numbering into the thousands. Some of the people were trained for a day, some for 2 days. There was no followup on the people trained and they were not trained in a coherent fashion to achieve a certain skill.

Mr. THOMAS. When a person is educated, he always remains educated. Like a boy, if you teach him to swim, he never forgets it.

Mr. PITTMAN. If you cannot find him, he is no good to you.

Mr. THOMAS. He is not lost. He is there. He will respond when the bell rings. He is going out and give to the public the benefit of his education.

Mr. DURKEE. We are hopeful there will be that kind of response.

NATURE OF TRAINING IN OCD SCHOOLS

What we are proposing here is a different kind of training in the schools. We have canceled all the previous courses of the school except for two courses in the radiological defense field.

We have taken the remaining 42 courses and reduced them to 3 courses. What we are now proposing to do is to train professional civil defense personnel in these schools in the five courses named in the books.

Mr. THOMAS. That is what we have been doing in more or less the same degree.

Mr. DURKEE. No, you have not.

Mr. THOMAS. We have been training the leaders and they go back and train some more. Are we still making the contribution?

Mr. DURKEE. We are still making contributions. This is a separate subject.

STUDENT TRAVEL

Mr. THOMAS. Refresh our memory on the contribution. We pay for the transportation and subsistence.

Mr. DURKEE. We are authorized to spend $300,000 a year on student travel. We will spend not quite that full sum this year, but we are budgeting for that full sum. There is a restriction we cannot go over that amount.

Mr. THOMAS. Where is the restriction?

Mr. DURKEE. In the law itself.

Mr. THOMAS. What about this subsistence?

Mr. DURKEE. Subsistence is included in the $300,000 figure.

Mr. THOMAS. And we pay for the cost of operation and maintenance of the schools?

Mr. DURKEE. Right.

Mr. THOMAS. How long is the course, from 3 days to 2 weeks?

Mr. DURKEE. No, sir; the courses now will run from a week to 2 weeks.

Mr. THOMAS. That is worth the money. You have been doing it all along. You are tied down to a $300,000 limitation?

Mr. DURKEE. Yes, sir.

Mr. THOMAS. That is a long way from $20,885,000. You have $20,585,000 to go.

TRAINING MATERIALS

Mr. DURKEE. Shall I go to the next subject, which is the next area of training and education?

With these trained professional civil defense people, the next part of the program is the production of training materials in a wide variety of civil defense skills training which will be made available to the civil defense structures around the country for their own training at their own locality in their own schools.

RESPONSIBILITIES OF TRAINED PERSONNEL

Mr. THOMAS. I want to ask you a question. I want you to answer the same question you asked me before. After you train these people and if they get lost, what are you going to do about that?

Mr. DURKEE. We do not intend to let them get lost.

Mr. THOMAS. How will you do that? Are you going to give them a refresher course every year? Are you going to stay in correspondence with them?

Mr. DURKEE. Let me say we are building our entire training and education structure on an on-going civil defense apparatus in each State and each locality. They will have the responsibility for training the people in their locality to work with them on civil defense operations.

We are providing them with the materials to undertake this kind of skilled training.

Mr. THOMAS. Suppose one of them says, "Well I am going to move to Illinois or Rhode Island?

Mr. DURKEE. We are hopeful if that happens, the man who got that training will receive some kind of certification of his training, and he will go to his new community and make contact with his new civil defense director and say, "I am qualified to do so and so."

Mr. THOMAS. What I am getting at is, you have no strings over him. Perhaps you should not have.

Mr. DURKEE. We certainly have no strings.

PREVIOUS EXPENDITURE FOR CIVIL DEFENSE TRAINING, EDUCATION, AND INFORMATION

Mr. THOMAS. Let's get the program down to a realistic basis. This figure of $20,885,000 is certainly out of line. You have been doing this thing for 10 years, and what can you put your finger on for your money?

What is the amount of money that you spent on your education and training program in the last 10 years? Insert it in the record at this point, the figure by years.

(The information supplied follows:)

Ten-year history of obligations incurred by OCDM and predecessor agencies for civil defense training, education, and public information programs

[In thousands]

1953	$436	1959	2,687
1954	324	1960	3,295
1955	752	1961	3,474
1956	1,428	1962 (Department of Defense estimate as of Mar. 1, 1962)	7,674
1957	1,619		
1958	1,639		

Mr. THOMAS. Do you have the total figure available?
Mr. DURKEE. I do not have the total.
Mr. THOMAS. How many years do you have it for?
Mr. DURKEE. 1960 and 1961, which I gave you.
Mr. THOMAS. Is that all?
Mr. DURKEE. Yes.

SCOPE OF FUTURE EDUCATION

Mr. PITTMAN. May I comment that the training and education required under this program that we have projected is a different animal than the training and education that predated any plan to create a shelter system. This is all oriented around the training of the American population to use a system of shelters. It is to make an effective system. If we do not have a system of shelters, I could not agree with you more.

Mr. THOMAS. You are not going to limit it to just one field of education? The survival program is just as important as the shelter program. You have to take care of them after they get out of the shelter.

Mr. PITTMAN. To make effective use of a system of shelters covers many subjects, it is true, but our training is focused and oriented in this way, and in the absence of prospects for a nationwide system of shelters, this would not make sense. It would not have made sense several years ago, and I am not sure how much of a training program would make sense in the absence of a system of shelters. I think this is fundamental and I would like to call the committee's attention to it.

Mr. THOMAS. I do not know that we can agree with you there. The general subject is one of some skill, knowing what to do under certain circumstances.

Your predecessors have spent a good many dollars on pamphlets in trying to educate the public on what to do under certain circumstances, and perhaps what not to do.

You might have to dig up some of those old pamphlets that have been circulated throughout the country several times in the past.

Mr. PITTMAN. We have been struggling to obsolete a great many of them. It is rather difficult to do. They are all out in circulation; there is a vast amount of publications in circulation, as you point out. We are trying to reorient them all toward the program objectives we now have.

INFORMATION ON SHELTERS AND SURVIVAL

Mr. OSTERTAG. Of course, under your predecessor, and partially under your own administration, there has been approximately $15 million appropriated for this program, yet you have had no shelter program.

Now, do you mean to say that was all for naught by virtue of the lack of a shelter program. It was justified without the shelter program.

Mr. PITTMAN. I realize it was.

If I may speak for myself, I do not fully appreciate the justification for the past civil defense programs. There was no structure to support with all these peripheral activities. Without prospects for

the shelter system, I personally would not have devoted myself to the program. I do not think it would make enough sense. With the shelter system, you have inescapable demands in many of these areas—warning, training, education, public information, and, particularly, the organization of health activities. All of these elements then begin to make sense and have a purpose because you have a way to carry people through those first few weeks. It particularly adds new demands on the training.

Mr. OSTERTAG. There are many aspects of the education and training and public information part of civil defense that is not directly associated with the shelters; is that not true?

Mr. PITTMAN. Very little if you treat shelters as a broad concept of how you find your way into them and how you live in them and how you emerge from them.

PROVISIONS OF TRAINING, EDUCATION, AND INFORMATION ESTIMATE

Mr. THOMAS. What part of this $21 million figure is for salaries and expenses and what part is for printing and binding?

Mr. PITTMAN. None for salaries and expenses except for the administrative expenses of the adult education program and the OCD schools.

Mr. THOMAS. How much money is involved in this $21 million for salaries?

Mr. PITTMAN. About $140,000 for employees of the Office of Education administering the adult education program.

Mr. THOMAS. How many jobs?

Mr. PITTMAN. Sixteen.

Mr. THOMAS. Roughly, what is the rest of the money for?

Mr. DURKEE. The schools are budgeted at the figure of $850,000. The operation of schools is about $500,000. Student travel, $300,000, and training supplies and equipment, $50,000.

Mr. THOMAS. Can you put it all together in one table; salaries and equipment for your $21 million? It is broken down into about five programs here.

Mr. DURKEE. I can break it down into figures which relate to the cost of development of the programs themselves, that is, the information that has to go into it. The cost of the production of the materials themselves and the distribution costs of the materials.

Mr. THOMAS. Do you spend any money in here for radios, newspaper, and television?

Mr. DURKEE. In the public information section, yes, with limited amounts in the training and education as a part of the training and education programs themselves.

Mr. THOMAS. Here in one breakdown you have printed materials, $2.2 million; distribution materials, $175,000; technical publications, $325,000; administrative cost, $5 million.

Here are some more materials, $1.2 million.

There is about 30 percent of your program there. It looks to me like you can break it down into two big categories, materials and jobs.

Mr. OSTERTAG. May I interrupt to say you must have had a breakdown of your own of how much you needed for each and every thing in order to arrive at this justification.

Mr. DURKEE. Yes, sir; I do. May I give it to you in some detail here?

ADULT EDUCATION PROGRAMS

Five million dollars for the adult education courses with the 50 States. This is based on an average cost of $100,000 for each State. I have a breakdown of the States that are presently in the program and those to come.

Mr. THOMAS. Is that a contribution to the States?

Mr. DURKEE. Yes.

Mr. THOMAS. Some salaries and expenses?

Mr. DURKEE. Salaries and expenses of instructors as part of the adult education apparatus of each State.

Mr. THOMAS. One hundred percent Government contribution?

Mr. DURKEE. Yes.

Mr. THOMAS. Can you not break it down into salaries and equipment for the record? We have it all in the record, your four programs here. When you do it, you are going to find out your salaries are about 50 percent, and your materials in the form of aids and what have you is going to be the other 50 percent, plus your administrative cost which I hope is no more than 5 percent of your program.

AVERAGE COST PER STATE OF ADULT EDUCATION PROGRAM

Mr. DURKEE. Let me break down the average cost of $100,000 for each State.

The average cost, salary, for the State coordinator (the man who runs the program in the States) and the team coordinators is 30 percent, or $30,000.

Mr. THOMAS. Do you mean that is for your top educator in the State?

Mr. DURKEE. That is correct.

Mr. THOMAS. Is there any Federal job that draws $30,000 a year now?

Mr. DURKEE. This is not for one man.

Mr. THOMAS. How many?

Mr. DURKEE. This is ranging from one to six people, depending on the size of the State. I am again giving you the average cost in these figures.

Travel of State personnel in promoting the program throughout the State is 15 percent, or $15,000.

The administrative expenses are $15,000, or 15 percent, and that is the development of local instructional material.

Mr. THOMAS. May I suggest we put that information in the record in tabular form?

(The information referred to follows:)

ADULT EDUCATION PROGRAM

Estimated average per State of cost of adult education program for fiscal year 1963 is $100,000. The breakdown is as follows:

Salary for State Coordinator and team instructors, 30 percent	$30,000
Travel of State personnel, 15 percent	15,000
Administrative expenses (development of local instructional materials, rent, utilities, supplies, equipment), 15 percent	15,000
Reimbursement to schools for each course ($60 per course), 40 percent	40,000
Total	100,000

(Federal funds are paid to the State. After a local course is completed, appropriate information and records are submitted to the State office, which then pays the $60 to the local school system or instructor.)

Total cost of adult education program.—Total cost is $5,570,000 broken down as follows:

Administrative cost, Office of Education	$185,000
State contracts	5,000,000
Instruction materials	385,000
Total	5,570,000

COST OF COURSE MATERIAL

Mr. PITTMAN. I think a figure I computed here might assist you. The cost of developing course material, the package, which includes training aids, developing and producing it, for the various programs where our role is primarily in developing materials, comes to $7.8 million according to my calculation. So that is approximately half the total for training and education, leaving out the public information program. This reflects an emphasis which we intend to accelerate on developing the course material ourselves and spreading the educational process out through existing educational institutions throughout the country.

FINANCIAL ASSISTANCE TO STATES

Mr. THOMAS. We will insert pages 32A and 33 in the record.

(The pages referred to follow:)

Financial assistance to States—Program summary

	1961, actual	1962, estimate	1963, estimate
Survival supplies and equipment		$5,000,000	$6,000,000
Emergency operating centers		5,000,000	8,000,000
Personnel and administrative expenses		11,185,799	18,000,000
Total obligations		21,185,799	32,000,000

Mr. THOMAS. In financial assistance to States, you have survival supplies and equipment, $6 million in 1963 against $5 million in 1962. Personnel and administrative expenses is $11,185,000 and goes up to $18 million in 1963.

We will insert pages 34 through 39 in the record at this point.

(The pages referred to follow:)

FINANCIAL ASSISTANCE TO STATES, $32 MILLION

Federal funds have been granted the States and their political subdivisions since 1952, pursuant to section 201(i), Public Law 920, as amended, in order to permit the matching of State and local costs incurred in providing the supplies, materials, facilities, and training necessary to establish a more effective national civil defense capability. As of January 1, 1961, this program was further expanded, with the implementation of section 205 of the above law, to include personnel and administrative expenses directly related to civil defense. Such assistance has greatly influenced the capability of the States, counties, and cities in securing organizational supplies, equipment, and facilities and in obtaining a more adequate personnel staffing to meet their emergency responsibilities. Funds requested herein are necessary to permit the continued support of this program under the activities indicated below.

A. Survival supplies, equipment, and training, $6 million

State and local governments have the operating responsibility for civil defense. The success of the Federal civil defense program depends largely on the ability of the State and local civil defense organizations to develop and organize the program in each community. Funds requested under this heading will be matched by State and local funds and used to acquire essential equipment and provide specific instruction to citizens which support and extend activities of the Federal Government in the total civil defense program. Equipment procured under this program will permit State and local governments to translate training and education activities of the Federal Government into positive capabilities at the local level.

This activity includes items included under the following headings in budgets for previous fiscal years:

Activity	Obligations	
	Fiscal year 1961 actual	Fiscal year 1962 estimate
Public safety devices	$485,103	$370,000
Medical supplies and equipment	158,910	45,000
Mass care equipment	10,896	30,000
Engineering supplies and equipment	1,144,879	260,000
Radiological maintenance equipment	116,234	250,000
Training and public information	838,324	785,000
Communications	4,382,356	2,595,000
Warning	1,250,135	665,000
Total	8,386,837	5,000,000

State and local plans for survival operations in the immediate postattack period require revision as they are oriented toward mass evacuation as opposed to mass shelter. Plans must be revised and resources inventoried before complete estimates of the items needed can be made. However, it is anticipated that the requirements in fiscal year 1963 would be somewhat higher than estimated for fiscal year 1962. Extension of warning systems and maintenance of warning and communications systems as well as previously planned acquisition of survival equipment will continue. The necessity for increasing special skills available at the local level to perform shelter planning activities and to insure a competent base for postattack survival operations will require an increase in training and specialized equipment at the local level. In addition, education of the public to the plans for shelter occupancy will be an increasing need as shelters are marked and stocked.

Public safety devices.—To provide for items such as rescue trucks and equipment needed by communities following an attack. This will permit the development of a rounded civil defense capability extending into the period after emergence from shelter.

Medical supplies and equipment.—To provide necessary medical supplies and equipment for:

(*a*) Stocking shelters identified through local effort, consistent with Federal stocking criteria;

(*b*) Obtaining equipment for training in first aid and casualty care; and

(*c*) Establishing reserve supplies for use in hospitals and planned emergency treatment centers.

This will extend the Federal program for shelter stocking and stockpiling of medical supplies to provide for specific additional requirements of local communities.

Mass care equipment.—For basic items of equipment required in emergency feeding and housing for the unhoused during the period of rehabilitation and reorganization after emerging from shelter and to permit the development of mass feeding capabilities in large community shelters identified under the Federal survey program or constructed under the Federal incentives program.

Engineering supplies and equipment.—For emergency electric power and portable water supplies. Includes such items as water purification equipment, portable pumps, and generating sets. This assists the city or the community in maintaining essential services for shelters and for continuation of these services after emergence from shelter.

Radiological monitoring equipment.—For special testing and calibrating equipment required for maintaining radiological monitoring equipment in effective operating condition. Monitoring equipment is provided by the Federal Government. Onsite maintenance of radiological detection instruments used in training exercises, equipping shelters and in monitoring sets is a State and local responsibility. This supports the planning donation of monitoring equipment.

Training and public information.—To provide assistance in the costs of the training function and training aids for State and local development of specialists such as radiological monitors, first aid personnel and rescue workers, and in the education of the individual citizen to the results of thermonuclear attack and his community plans. Training material developed by the Federal Government and instructors trained by the Federal Government will be used in the accomplishment of this training activity.

Communications.—To equip emergency operating centers, community shelters, radio broadcast stations with the items necessary to disseminate and receive vital instructions and information. This supports the development of improved communications techniques and the organization at the State and community level for warning, radiation detection, occupancy of shelter and planned post-attack recovery.

Warning.—For warning devices and controls to be used by the community and for the maintenance and recurring costs of this equipment. This will provide local capability for the dissemination of warnings issued over the NAWAS system.

b. Emergency operating centers, $8 million

The objective of this program is to develop emergency operating centers for each State government and for the governments of each of the major political subdivisions within the States. First priority of Federal funds will be directed toward financing the State centers; however, the use of Federal funds for State emergency operating centers will depend upon the availability of State matching funds. Federal funds found excess to State demands will therefore be extended to political subdivisions with funds appropriated for the design and construction of emergency operating centers.

At the present there are 24 completed emergency operating centers and an additional 40 under development; of this number, 7 have been completed and 8 are under development by State governments. The fiscal year 1962 budget for these projects is $5 million. Current projections indicate expenditure of approximately $4 million to complete structures now approved for phase I study and design. Additional new starts are estimated at $1 million. It is anticipated that during fiscal year 1963 there will be 25 new starts, 6 of which will be by State governments. Funding will be completed for those centers started in previous fiscal years. It is estimated that $8 million will be required to carry out these activities.

c. Personnel and administrative expenses, $18 million

The redirection of the civil defense program with emphasis on fallout shelter surveys and construction will bring a marked increase in the expenditure of funds for personnel and administrative matters primarily at the local level. Funds requested herein are essential to the further development and expansion of an effective civil defense throughout the Nation. Estimates received from States Governors and civil defense directors indicate that State and local governments anticipate the appropriation of approximately $22 million against which Federal matching funds may be claimed for personnel and administrative expenses.

State civil defense, $5,500,000.—The State civil defense organization has the responsibility of directing and coordinating civil defense activities at the local level. It must, therefore, assist in the redirection of planning, organization, training and public information at the local level and bring national objectives, priorities and standards to local units throughout the country. In addition, State governments have the responsibility to make plans for the direction during the emergency period of State level survival operations and resource management.

Some State civil defense staffs must be augmented, and as local staffs are enlarged and additional political subdivisions enter the program, the State organization will become increasingly active and effective.

Local civil defense, $12,500,000.—The fallout shelter programs conducted by the Federal Government will have the concomitant effect of increasing the planning, organizational, training and operational activities of political subdivisions now participating in the program and will bring new subdivisions into the program. Local civil defense staffs will be called upon to assist architectural and engineering contractors hired by the Federal Government in obtaining data in the national fallout shelter survey; to secure from building owners licenses for use of space as shelter; to receive, stock, issue, and deliver federally procured survival supplies for each identified fallout shelter and make periodic inspections of these supplies in the shelters; to review project applications in the Federal fallout shelter incentives program, and certify to the necessity of shelter spaces at the location concerned; to make available technical information and guidance to building owners and architects and engineers developing shelter spaces either in the incentives program or privately developed shelter; to assist in monitoring commercial shelter and shelter supply dealers to protect the public from fraudulent operations; to revise operational survival plans to reflect the change in basic tactics from evacuation to shelter, including the development of plans for movement of the population to shelter, shelter management plans, revised communications plans to permit the local government to issue guidance and instructions to their citizens in shelter; to undertake a greatly stepped up public information and education program to permit the people to make effective use of the shelters; and the training of a large number of people as shelter managers and shelter staff personnel such as communicators, radiological monitors, food and water distribution personnel, and sanitation specialists.

In addition to the above new tasks, considerable ongoing work in civil defense at the local level must be continued, such as the improvement of warning systems, the improvement of the radiological monitoring and evaluation system, the updating of survival item inventories, and the recruiting, training, and assigning of local government employees and volunteer auxiliaries to essential emergency services.

GAO REPORT ON OCDM FEDERAL CONTRIBUTIONS PROGRAM

Mr. THOMAS. This $32 million is broken down.

May I suggest you read the Comptroller General's report in this regard in which he says that a good part of this money that has been on a matching basis for civil defense functions has been used by the various political subdivisions of the States in their ordinary day-to-day operation of the government of the subdivision.

Mr. PITTMAN. You might like to have our comment on that report which was submitted to GAO a few weeks ago. We can make it available for the record.

Mr. THOMAS. Submit it for the record and briefly summarize it for us.

(The information referred to follows:)

DEPARTMENT OF DEFENSE,
ASSISTANT SECRETARY OF DEFENSE,
Washington, D.C., February 16, 1962.

Hon. JOSEPH CAMPBELL,
The Comptroller General of the United States.

DEAR MR. CAMPBELL: This is in reference to your letter of December 19, 1961, to Secretary McNamara and your Report, No. B133209, to the Congress on the Review of Federal Contributions Program, OCDM, Executive Office of the President. Enclosed are this Department's comments on the report.

I would like to take this opportunity to thank you and your staff for giving us the benefit of this timely and comprehensive report.

Sincerely,

STEUART L. PITTMAN.

DEPARTMENT OF DEFENSE COMMENTS CONCERNING REPORT TO THE CONGRESS OF THE UNITED STATES REVIEW OF FEDERAL CONTRIBUTIONS PROGRAM, OFFICE OF CIVIL AND DEFENSE MOBILIZATION, EXECUTIVE OFFICE OF THE PRESIDENT

(Dated December 1961. Report No. B–133209. OSD Case No. 1597)

Subject report covers an audit of actions, procedures, and methods prior to August 1, 1961. Executive Order 10952 transferred the responsibility of administration of the Federal contributions program from OCDM to the Secretary of Defense effective August 1, 1961. This response is therefore addressed to the recommendations made and indicates the corrective controls, changes, and actions which have been taken and those which DOD is preparing to implement.

We concur in the main thrust of the GAO findings and recommendations which we interpret to conclude that the procedures used in determining the need for civil defense facilities and equipment have been inadequate in recent years. The possible misuse of equipment purchased with Federal contributions for local governmental activities may well be the result of the procedures then employed by OCDM and to lack of adequate communication with State and local officials on the full significance of the certifications which they were asked to make.

Shortly after assuming responsibility for the program, DOD directed all regional offices, on August 22, 1961, to suspend further approval of all Federal contributions except for those items which are unique to civil defense and those which permitted continuation of certain activities in which the Federal Government had a partial investment. After critical review of the program the suspension was lifted on September 22, 1961, with the announcement of certain new requirements. (See enclosure 1.) These interim procedures make it necessary for a State or local government to have a legally constituted civil defense organization and an approved operational plan to be eligible for Federal contributions. In addition, these new procedures require the applicant to demonstrate that the civil defense need exceeds his currently available resources and his normal governmental need for the items required. This procedure gives OCD a much broader basis for analyzing the applicant's needs and a means of evaluating the request for contributions in terms of his normal governmental requirements.

The discretion of the OCD regional directors to approve or disapprove applications on the basis of their reasonableness in relation to an overall civil defense plan is sufficient to avoid the results described in the GAO report. Final procedures to replace the interim procedures will go as far as practicable in developing precise standards to guide regional directors on the relation between civil defense and normal governmental requirements. However, they will retain the discretion necessary for realistic administration of the matching funds program. This program must keep pace with the constant development and improvement of local civil defense programs, as the Federal program becomes increasingly reflected in local planning. In the case of certain types of equipment, it is anticipated that considerable specificity in standards and criteria for determining local civil defense requirements will be developed on the basis of experience gained under the interim procedures. However, there will continue to be primary reliance on the local civil defense plan and the experience of OCD program administrators with local government practices in determining the need

for special types of equipment. Comments on individual program recommendations follow.

COMMUNICATIONS PROGRAM

GAO recommendation

We recommend that the Secretary of Defense (1) discontinue approvals of communications equipment for use by police, fire, public works, highway, conservation, and other public safety departments of State and local governments, unless it is clearly shown that such equipment is for civil defense purposes and over and above normal needs and (2) make reasonable technical evaluations, including field reviews, of outstanding approved project applications covering equipment to be used by public safety departments to determine whether the applications should be canceled.

Comment

We concur in the first recommendation subject to the comments in the covering memorandum.

We concur in the second recommendation. Interim OCD procedures dated September 18, 1961, have provided a greater degree of surveillance in making technical evaluations (enclosure 1).

TRAINING CENTER PROGRAM

GAO recommendation

We recommend that the Secretary of Defense suspend approvals of training centers until adequate criteria can be developed to provide regional offices with a basis for determining what parts of the centers are for civil defense and over and above normal requirements, and, using the criteria developed, evaluate the outstanding approved applications, amending them so as to withdraw approval of those parts which are for normal requirements.

Also, we refer to our recommendation to initiate comprehensive program reviews according to which we believe that the Secretary should establish a system of review for informing top management as to whether training centers have effective, continuing civil defense training programs in operation. A requirement for periodic reporting by applicants on training activities should be included as part of this system with a view toward strengthened program administration.

Comment

As recommended, the program was suspended. Following a critical review the criteria as set forth in enclosure 1 were developed. In setting the criteria for the scope of review of project applications, the Assistant Secretary of Defense (Civil Defense) stated specifically in regard to training centers (enclosure 2):

"Conversely, normal availability of classroom space should make unnecessary the construction of such facilities for the conduct of civil defense training."

Project applications were approved by OCDM on the basis of criteria available at the time of justification by the State. Criteria for these facilities are under continuing reevaluation and improvement. While OCD cannot properly insist on continual amendments to prior agreements in order to reflect these new criteria, OCD will make evaluations of the use of training centers and in conjunction with the States will work to introduce more effective training procedures and utilization of such centers.

We concur in the second recommendation. OCD Training and Education Office is preparing new criteria which will provide for (*a*) semiannual reports of training accomplished at the training center and (*b*) annual review and inspection of training activities in the center by OCD personnel. These new criteria will be implemented with the issuance of the revised manual.

CENTRALIZED TRAFFIC CONTROL PROGRAM

GAO recommendation

We recommend that the Secretary of Defense make a technical evaluation of these three project applications approved under the centralized traffic control program and allow Federal contributions for only that equipment which is for civil defense and over and above the normal requirements of the applicants.

We also recommend that the Secretary evaluate the need for the program for centralized traffic control in general and consider discontinuing the program if its usefulness is not demonstrated.

Comment

In regard to the first recommendation, the technical evaluation of the program recommended was made by OCDM prior to August 1, 1961, which resulted in the cancellation of one project and a reduction in the Federal share of the other two.

We concur in the second recommendation and are undertaking a continuing review to evaluate the effect of current criteria on this program.

HELICOPTER PROGRAM

GAO recommendation

We recommend that the Secretary of Defense suspend approvals of project applications under the helicopter program until an administrative determination can be made as to a fair share of the total cost to be borne by the Federal Government.

Also, we refer to our recommendation to initiate comprehensive program reviews according to which we believe that the Secretary should require reporting by applicants on the use of helicopters and conduct field reviews to obtain information as to how helicopters are being used and whether they are being maintained in a state of readiness for a civil defense emergency.

Comment

In regard to the first recommendation, the use of helicopters is limited to civil defense purposes. Since no other use is authorized, when civil defense need represents only a part of the purchase requirement, no contribution will be made.

We concur in the second recommendation. As a part of a continuing review activity OCD personnel will make an annual field inspection of each helicopter.

HOSPITAL GENERATOR PROGRAM

GAO recommendation

We recommend that the Secretary of Defense (1) suspend approvals and payments for hospital generator applications until detailed criteria can be developed to provide regional offices with a reasonable basis for determining whether the generators are over and above normal requirements; and (2) use the criteria developed to evaluate approved project applications and cancel any approvals which are not in conformity with these criteria.

Comment

In regard to the first recommendation, the program has been suspended since February 28, 1961.

With reference to the second recommendation, the question of criteria is still under review.

EMERGENCY WELFARE PROGRAM

GAO recommendation

We recommend that the Secretary of Defense (1) suspend approvals of applications for cafeteria equipment under the emergency welfare program until well-defined criteria can be developed to provide regional offices with a reasonable basis for review; and (2) use the criteria developed to evaluate all approved applications for cafeteria equipment and cancel any approvals which are not in conformity with these criteria.

Comment

In response to the first recommendation, the interim OCD procedures dated September 18, 1961, establish criteria for basic eligibility, requirements for project applications, and requirements for approval.

In addition, the Department of Defense news release of January 8, 1962, designates dispersal or evacuation from the area as an alternate plan. This, in conjunction with the OCD priority program of marking and stocking shelters with food, limits the possibility of project application approval for cafeteria equipment to those cases where the operational plan clearly demonstrates that mass feeding is practical and necessary.

With reference to the second recommendation, those projects approved by OCDM are under continuing compliance review to make certain that the conditions of the approval are met.

POLICE SERVICES PROGRAM

GAO recommendation

We recommend that the Secretary of Defense suspend the approval of firearms and related equipment under the police services program until a determination is made as to whether effective controls over the approval and use of the property can be established.

Comment

We concur in the recommendation as it relates to firearms and have suspended approval of these items. The application of interim procedures provides criteria necessary for regional approval of related equipment.

EMERGENCY OPERATING CENTER PROGRAM

GAO recommendation

We recommend that the Sercetary of Defense review the location criteria for emergency operating centers before additional Federal funds are committed under this program. We further recommend that the Secretary consider requiring centers to be manned 24 hours a day, and to maintain an adequate supply of food.

Comment

Individual projects are reviewed, in detail, at the national level, in order to assure the State and OCD that full advantage is taken of all information relative to weapons systems and methods of delivery. It is believed the present criteria represent the closest practical approximation of the ideal. Changes will of course be made as appropriate.

The second recommendation is that OCD consider requiring emergency operating centers to be manned 24 hours a day and to maintain an adequate food supply. We do encourage the assignment of personnel having emergency operating responsibilities to operate from the emergency operating center on a daily basis. We do not feel we can now require that such assignments cover 24 hours of each day. However, such a requirement has merit and will be considered as a possible future course of action.

We also encourage maintaining an emergency food supply and require that storage space and facilities to store the food be provided. We are reviewing this requirement with a view toward expanding it to include the acquisition of an emergency food supply.

INADEQUATE SUPPORT FOR CLAIMS PAID BY APPLICANTS

GAO recommendation

We recommend that the Secretary of Defense require applicants to submit, in the future, adequate documentation in support of their claims, such as paid vendors' invoices, purchase orders, contracts, and evidence of competitive bidding.

Comment

We concur in the recommenation to the extent that we are instituting procedures that will require the State to have the original or true copies of purchase orders and/or contracts, vendors' invoices, bidding data, and evidence of payments on file. The States are being encouraged to have trained personnel perform comprehensive audits of this material and all related documents. In addition, with the increased OCD audit personnel, site audits are being made at State and local levels.

FEDERAL FUNDS ADVANCED WHEN NOT REQUIRED AND WITHOUT CONTROLS TO ASSURE PROMPT USE OR REFUND

GAO recommendation

We recommend that the Secretary of Defense require applicants to submit their bases for the legal requirements for advances and that he place reasonable time limits on all project applications to attain prompt liquidation or return of advances.

Comment

We concur in the recommendation. Accounting Systems Memorandum No. 12 effective October 27, 1959 (enclosure 2), has been partly responsible for the decrease in the percentage of outstanding advances, to the unliquidated obligations from 35 percent to the current percentage of 23. Monthly follow-up procedures have been implemented since by forwarding the advance subsidiary contributions appropriation IBM run to each region with a request that a copy be sent to each State urging a return or accounting of long outstanding advances. OCD will implement a requirement that each region have on file the legal requirement of each State where advances are requested.

GAO's recommendation that reasonable time limits be placed on all project applications is concurred in. A modification to the Contributions Manual AM 25–1 will establish time limits within which projects must be initiated with an automatic cancellation upon failure to meet the completion date. Provision is made for extension of the time limit upon request and justification.

NEED FOR COMPREHENSIVE, CONTINUING REVIEWS OF PROGRAM ACTIVITY AT THE STATE AND LOCAL LEVELS

GAO recommendation

We recommend that the Secretary of Defense initiate a program for continuing, comprehensive reviews of program areas under the Federal contributions program to obtain better compliance with pertinent laws and agency policies, procedures, and requirements. The desirability of these reviews was specifically brought out by our examination of the training center and helicopter programs.

Comment

We concur in the recommendation. OCD has authorized the audit staff to be more than doubled, which will provide for continuing comprehensive audits.

Regional offices also conduct program reviews, coordinated by the Financial Assistance Office.

POSTATTACK EFFECTIVENESS OF APPROVED PROJECTS REDUCED THROUGH LACK OF REQUIREMENTS FOR EMERGENCY POWER AND SUPPLIES

GAO recommendation

We recommend that the Secretary of Defense, when considering approval of future project applications, require applicants to provide power, fuel, and other necessities, as may be warranted in individual circumstances, to assure greater postattack capability. In addition, we recommend that the Secretary encourage previous applicants to provide emergency power, fuel, and other necessities as needed.

Comment

The interim procedures of September 18, 1961, require a planned use which is reasonable and practical. We will initiate a followup on items previously acquired by the States and their political subdivisions and specifically encourage the acquisition of appropriate additional supplies and equipment necessary to assure postattack effectiveness.

[Enclosure 2]

SEPTEMBER 22, 1961.

MEMORANDUM TO ALL REGIONAL DIRECTORS

Subject: Federal Contributions for Supplies, Equipment and Facilities.

Federal financial assistance to State and local governments is to be an increasingly important factor in facilitating the orderly development of adequate national civil defense preparedness. Federal assistance should be provided wherever it is possible to promote essential civil defense activities, but Federal financial assistance cannot be used as a substitute for complete and effective State and local emergency planning. Your appraisal of each request for Federal funds is the most important single factor in the effective use of financial assistance to increase the civil defense readiness of the Nation and insure that this expenditure of Federal funds results in an identifiable and measurable improvement in civil defense.

The attached paper describes the requirements for processing project applications for supplies, equipment and facilities. I expect you, in coordination with State officials and with full utilization of your staff, to make such investigations as are necessary to make certain that the Federal investment is reasonable and logical and is the best possible under the circumstances. The application for Federal assistance should be viewed as an opportunity to extend Federal guidance and direction to State and local planning, particularly in the area of effective utilization of available resources and in the logical and orderly development of civil defense organization.

The scope of your review will, of course, be directly related to the extent to which the requested items are found in daily use. For example, civil defense need for radiological instruments, warning systems and training and public information activities is readily apparent since there are few requirements for use of these items in routine daily activities. Conversely, normal availability of classroom space should make unnecessary the construction of such facilities for the conduct of civil defense training.

The limitations on project applications contained in the TWX of August 22 from the Acting Defense Representative are hereby rescinded. Additional copies of the attached interim procedures will be forwarded for your distribution to the States.

STEUART L. PITTMAN,
Assistant Secretary of Defense
(Civil Defense).

[Enclosure 2]

Civil Defense Interim Proceedures

DEPARTMENT OF DEFENSE

OFFICE OF CIVIL DEFENSE

September 18, 1961

FEDERAL MATCHING FUNDS FOR CIVIL DEFENSE EQUIPMENT

Interim procedures pending revision of Administrative Manual AM25–1, Federal Contributions for Civil Defense Equipment

There is a joint responsibility to spend Federal contributions wisely and with the certainty that every dollar spent is a direct and timely contribution to the orderly progress toward civil defense readiness. While OCD will give maximum possible support to those governments that are moving forward aggressively, we will not contribute to frills, nor to nebulous or unrewarding programs. This will necessitate a critical appraisal of civil defense projects funded in part with Federal money, both by the State civil defense agency and by OSD.

Review and approval of project applications under the provisions of AM25–1 will be governed by the following criteria:

1. *Basic eligibility.*—In order for a State or a political subdivision to be eligible for Federal contributons:

(*a*) The State civil defense agency must have either a full-time director or a full-time deputy director and the State must have an OCD approved State operational plan as prescribed in Paragraph 4.2., AM25–2.

(*b*) The political subdivision must have a legally constituted civil defense organization with a full-time or part-time director and a State approved operational plan consistent with the State plan.

2. *Requirements for project application.*—Each project application must be supported by a justification which includes—

(*a*) The applicant government's total civil defense requirement for the items for which a Federal contribution is requested.

(*b*) The applicant government's total normal requirement for the items.

(*c*) The number or amount of the items currently available to the applicant government.

(*d*) A statement relating the use of the item or items to be acquired to specific emergency activities and functions set forth in the approved operational plan.

(*e*) A plan for future acquisition of the item or items still required to meet the total civil defense requirement.

3. *Requirements for approval.*—In addition to determining that the items requested are eligible in accordance with the provisions of AM25–1, the regional director will analyze the justification to determine whether, in his judgment:

(*a*) There is a sufficient supply available to the applicant to meet the civil defense requirements.

(*b*) The items requested are in addition to the applicant's normal requirements.

(*c*) All or a portion of the request is necessary to meet the applicant's civil defense requirements.

(*d*) The applicant's planned use of the items is reasonable and logical.

This analysis must be in writing and must support the regional director's decision to approve or disapprove the application.

4. *Special requirements for emergency operating centers.*—

(*a*) All emergency operating center applications must be submitted to the Director of Financial Assistance for review prior to approval. Each such application must be accompanied by the regional director's comments and recommendations.

(*b*) Funds to cover approvable emergency operating center applications will be allotted to the regional director from the emergency operating center reserve fund on a project basis. A request for such an allotment must be directed to the Director of Financial Assistance. The regional director must not actually approve the application until he receives official notice of the allotment.

In the interest of economy and efficiency, State civil defense directors should not approve project applications which do not meet the criteria in 1 and 2 above or which they do not believe will meet the criteria in 3 above.

OFFICE OF CIVIL AND DEFENSE MOBILIZATION, BATTLE CREEK, MICH.

ACCOUNTING SYSTEMS MEMORANDUM LIMITED DISTRIBUTION NO. 12

ADMINISTRATION

OCTOBER 27, 1959.

To: Those listed below.

Subject: Request for advance of funds, OCDM form 237.

The purpose of this memorandum is to estabilsh procedures in order to eliminate advanced funds lying idle in State treasuries for long periods before actual utilization of the funds is made. The prescribed procedures are as follows:

1. When the State is precluded from expending State funds in excess of the State's share of the estimated cost of the equipment subject to reimbursement by the Federal Government, the contracting officer of the region will determine the approximate date on which these Federal funds will be expended by the State or political subdivision concerned.

2. When the State law requires funds on deposit, in addition to its own, available for obligation and expenditure to cover the estimated cost of equipment, the contracting officer of the region will determine the approximate date on which funds will be obligated by the State or political subdivision concerned.

3. The following notation will be made on the back of all copies of the request for advance form and signed by the contracting officer (regional director or person acting in his absence):

"Requested advance is required by this State not later than ——————."

——— ———,

Contracting Officer.

4. The Fiscal Division will withhold the scheduling of advances for disbursement until 10 days prior to the date the funds are required as indicated by the contracting officer. No advance will be made unless the approximate date on which these funds are needed is indicated on the reverse of OCDM form 237, properly signed by the contracting officer.

5. Consideration should be given to making partial advances on large construction contracts requiring progress payments over a long period of time. In these cases the notation by the contracting officer will show two or more dates with amounts required at each date.

6. Prior to approving an advance the contracting officer should satisfy himself of the legal necessity for the State to have an advance of funds. If the advance of funds is not mandatory for the reasons printed on the request for advance form, the request for advance should be disapproved.

This memorandum becomes effective November 1, 1959 and all requests for advance of funds forwarded by the regions on or after this date must be processed in accordance with this procedure.

W. R. WILSON,
Director, Budget and Fiscal Office.

SUMMARY OF COMMENTS ON GAO REPORT

Mr. PITTMAN. I will comment with a very brief summary: we are in general agreement with GAO.

Mr. THOMAS. That ends all argument, then, does it not?

Mr. PITTMAN. I think it probably does. Back in September we introduced measures which were designed to meet the problem that the GAO report was concerned with.

Mr. THOMAS. Survival supplies, equipment, and training was $6 million. The amount for 1961 fiscal year was $8,386,837 and last year's estimate was $5 million. That includes public safety devices, medical supplies, engineering, radiological, et cetera. That is in the record. That is $5 million. Training, et cetera, are listed here. You spell it all out in the succeeding pages.

EMERGENCY OPERATING CENTERS

Emergency operating centers is $8 million. You break it down into State centers and governments of each of the political subdivisions within the States. How vital are these?

Mr. PITTMAN. These are vital to the continuity of State and local governments.

Mr. THOMAS. How many more do you have to build? What have you spent on the program since it has been in existence? This program is not too old. I think we helped you get it started in 1960 for the first time.

Mr. PITTMAN. The 1960 figures are $1.2 million.

Mr. THOMAS. Was it started before that, Mr. Pittman?

Mr. PITTMAN. I think it was started in 1960.

Mr. THOMAS. Was money spent?

Mr. DURKEE. Not much money was spent, but the program started to receive priority emphasis in 1960.

Mr. THOMAS. I do not think it was started in 1960. Could it have been sooner than that?

Mr. HOLT. To a small extent prior to 1960.

Mr. THOMAS. By years, state what you have spent at this point in the record. Can you read it into the record here?

Mr. PITTMAN. 1960, $1,162,000; 1961, $2,081,000; 1962 estimates, $5 million; and for 1963 we are requesting $8 million.

COMPLETED EMERGENCY OPERATING CENTERS

Mr. THOMAS. At present you have 24 completed. What did each cost you? Where are you building them? Where are the 24 located?

Mr. DURKEE. I have here, Mr. Chairman, a list of those completed emergency operating centers with the Federal share costs alongside, if you would like to have them.

Mr. THOMAS. Yes. Please read them into the record.

Mr. DURKEE. They have been completed in the following States: Delaware, a blast shelter, Federal share, $25,920.

Mr. THOMAS. A blast shelter?

Mr. DURKEE. That is right. This has blast protection in it.

Mr. THOMAS. How deep underground is it? Two hundred feet?

Mr. DURKEE. It has to meet the criteria we have established, 30-pounds-per-square-inch protection.

Mr. PITTMAN. Pounds per square inch—the blast pressure it will take.

Mr. DURKEE. Hawaii, blast protected, $10,000 Federal share; Maryland, blast protected, $125,075 Federal share.

Mr. THOMAS. How many square feet are there in the buildings? What did the three cost per square foot you have mentioned?

Mr. DURKEE. I do not have such figures.

Mr. THOMAS. Do you know how large the buildings are?

Mr. DURKEE. I do not have that information.

Mr. PITTMAN. Do we have any square foot figures? We will have to provide it for the record.

Mr. THOMAS. Does anybody have an opinion as to how much it will cost per unit foot?

Mr. PITTMAN. It is much higher cost because it is blast protection, not fallout.

Mr. RHODES. How many people can get into it?

Mr. THOMAS. Do you have that information?

Set out your table, the location, the number of square feet, unit cost per square foot, and the number of people it will accommodate.

(The information supplied follows:)

TABLE I.—*Protected emergency operating centers (completed)*

Government	Location	Design criteria	Size (square feet)	Planned occupancy	Construction cost per square foot [1]	Total construction cost	Federal contribution
STATE							
Delaware	Delaware City	Class I [2]	5,000	62	[3] $10.00	$51,840	$25,920
Hawaii	Harland Tunnel, Diamond Head, Oahu.	Class I	3,400	45	[3] 6.00	20,000	10,000
Maryland	Pikesville	do	7,800	97	32.00	250,150	125,075
Virginia	Richmond	Class II [4]	3,702	46	23.00	84,224	42,112
Rhode Island [5]							
Texas [5]							
Wisconsin [5]							
COUNTY							
Du Page, Ill	Wheaton	Class I	8,000	116	45.00	362,956	181,478
Dade, Fla	Miami	([6])	8,800	110	18.00	161,976	80,988
Baltimore, Md	Towson	Class II	3,970	50	[7] 7.00	27,616	13,808
Cumberland, Maine	South Windham	do	5,950	105	27.00	162,160	81,080
Harford, Md	Bel Air	do	3,200	40	38.00	112,906	56,453
Humboldt, Calif	Eureka	do	3,392	60	28.00	94,876	47,438
Kent, Del	Dover	do	8,158	100	17.00	141,754	70,877
King, Wash	Seattle	do	4,800	60	17.00	82,000	41,000
Maricopa, Ariz	Phoenix	do	5,200	75	30.00	153,806	76,903
Milwaukee, Wis	Milwaukee	do	10,000	120	[7] 7.00	73,808	36,904
Trinity, Calif. [8]	Weaverville	do	9,465	60	15.00	138,458	69,229
CITY							
Burbank, Calif	Same	Class I	13,000	162	32.00	422,400	211,200
Honolulu, Hawaii	Berkheimer Tunnel, Diamond Head.	do	18,000	157	[3] .80	14,110	7,055
Glendale, Calif	Same	([6])	3,800	60	37.00	138,390	69,195
Portland, Oreg	do	([6])	20,000	225	31.00	611,850	305,925
St. Louis, Mo	do	([6])	8,950	112	37.00	331,692	165,846
Olean, N.Y	do	Class II	4,700	75	23.00	105,532	52,766

[1] Rounded to the nearest dollar.
[2] Design blast loadings of at least 30 pounds per square inch peak side on overpressure, including protection against initial radiation with an attenuation factor of 1,000 to 1.
[3] Cost included only remodeling of space which already met class I criteria.
[4] Not designed for blast loading. Radiaton protection factor of 1,000 to 1.
[5] Built without Federal contributions; cost and design criteria not available.
[6] Design blast loadings of less than 30 pounds per square inch, including protection against initial radiation with an attenuation factor of 1,000 to 1. Constructed before present design criteral.
[7] Modification of plans for a portion of a new structure.
[8] Includes training center.

DESCRIPTION OF OPERATING CENTERS

Mr. YATES. What does one of these structures look like?

Mr. DURKEE. Let's take the one in Maryland. It is located just a few miles away. It has a protective entrance, as you would expect. It is a concrete structure.

Mr. YATES. Is it above the ground?

Mr. DURKEE. Some is above the ground, some below.

Mr. YATES. Do you have a picture of it?

Mr. DURKEE. Here is a picture of an operating center below ground.

Mr. THOMAS. We are familiar with your regional offices. Are these on the same style or a similar nature? Are they two or three floors underground and about half a story above ground?

Mr. DURKEE. The regional offices are not in protected sites at this time except the one under construction in Denton, Tex. They are not protected in this fashion.

Mr. THOMAS. Not as good as this?

Mr. PITTMAN. Did you refer to the Federal regional offices?
Mr. THOMAS. Yes.
Mr. PITTMAN. They are not protected.
Mr. THOMAS. I am talking about the two you are building.
Mr. DURKEE. There is only one under construction.
Mr. THOMAS. You have got one authorized for Boston. You said the dirt was already flying. We will assume that is two, then.
Mr. YATES. Is this a representation of what one of the blast shelters you described looks like, like the one in Maryland? Does that look like either of the pictures you are showing?
Mr. PITTMAN. Very different. One I have seen in Pikesville, Md., looks nothing like this. It looks like a bunker. Half the building is above ground, half below. It is a one-story building with dirt going up the side from all four directions.

USE OF EMERGENCY OPERATING CENTERS

Mr. YATES. Who will use it?
Mr. PITTMAN. In this case it is the Maryland State key government officials, including the State civil directors staff. It has a communications center in it to communicate with the Federal regional office and all of the local county operating centers.
Mr. YATES. These are blast centers only for the civil defense staffs?
Mr. PITTMAN. Yes, plus other key officials.
Mr. THOMAS. Are they all blast shelters now?
Mr. DURKEE. No, sir. Some of them only have fallout protection.
Mr. THOMAS. You are going to build blast shelters or fallout shelters for this $8 million?
Mr. DURKEE. Both.
Mr. PITTMAN. This is a matter of application by the States, which pay for half.

NUMBER OF CENTERS TO BE BUILT

Mr. THOMAS. This is for the 50 States, the State headquarters and the big political subdivisions. How many buildings will you build on an average in each State and what will this entire program cost, and how many years will it take you to finish it?
Mr. DURKEE. This depends entirely on applications from the States, cities, or counties themselves.
Mr. THOMAS. All the city hall boys are drumming up more business every day. Every one of them will want one.
Mr. PITTMAN. They have to put up half the money. They don't all have it.
Mr. THOMAS. If they do not have it, you cannot deny it. The Federal Government will be furnishing it all. That is the next step. What is a good opinion as to cost?

COST OF EMERGENCY CENTERS

Mr. DURKEE. There is no way of estimating the total cost. It depends on the applications we receive.
Mr. THOMAS. How much would you spend on 24 buildings? You have 24 in existence. They were built over the last 5 years.

Mr. DURKEE. The Federal contribution for 21 buildings was $1,771,252. Three were built without cost to the Federal Government.

Mr. PITTMAN. We have 40 under development. We are requesting $8 million for fiscal year 1963. That would be $200,000 apiece if those costs happen to come out in that fiscal year. That would give you a rough idea.

Mr. DURKEE. Let me give you another rough idea. Here are operating centers now under development in addition to those finished. These are nine States including three in one State and two in another State. The total presently obligated Federal share as of March 6, 1962, is $3,723,206. We estimate another $1.7 million Federal funds will be required to complete the projects in these nine States.

Mr. THOMAS. You are not saying this $8 million will wind up the program?

Mr. DURKEE. No, sir. I am giving you an example.

Mr. THOMAS. There will be one in each State for the headquarters in the biggest cities, in town. When you get through you can safely count on at least three or four projects to the State or maybe a half dozen.

How many will this $8 million take care of? You do not know the square footage cost or how large they are. How many different projects will the $8 million take care of?

Mr. DURKEE. Do we have the figure of anticipated starts for 1963?

Mr. HOLT. Twenty-five new starts.

Mr. THOMAS. Twenty-five at a cost of $8 million.

Mr. DURKEE. These are new starts anticipated for fiscal year 1963.

Mr. THOMAS. We assume your $8 million will complete the 25, is that correct?

METHOD OF FUNDING CENTERS

Mr. PITTMAN. Do we obligate all of the funds for a center at the time the application is approved?

Mr. BURNS. No, sir. There are up to three parts. First we have a preliminary application on which we get architects plans and review those. This cost is in the area of $5,000, $10,000, $15,000. Then the project itself may be broken into two or more phases, depending upon the size. A State like New York might want to start with a control center with a certain capacity. Having that approved for emergency purposes, then in the following fiscal year, it could add a wing to bring other functions into the picture. You may recall the Albany one. I think that one was estimated at about $4 million, in about three increments. It is hard to pin it down year by year from memory.

CRITERIA FOR CENTER CONSTRUCTION

Mr. THOMAS. You do not have any overall rules and regulations limiting the amount of square footage and the square foot cost or the depth underground and above ground?

Gentlemen, you had better strengthen this justification. It is very weak.

Mr. BURNS. We have a manual with criteria.

Mr. THOMAS. It is not in this book.

Mr. BURNS. You are correct.

Mr. THOMAS. You have it in your office. It belongs here.

Mr. BURNS. May we submit the key points for the record?

The criteria are very specific. In Chapter 14 of Manual AM25–1 it tells precisely what is to be complied with. We review the plans and specifications for each center on a national basis in order to make sure that we are getting what we are paying for and that the people are getting the protection. Another control is that we will not put warning and communications in on a permanent basis until these places meet the specifications. These are command and control points in a State, which are to receive warnings and to relay warnings and instructions to the people. We are vitally concerned with that fact.

(The matter referred to follows:)

EMERGENCY OPERATING CENTER CONTRIBUTIONS PROGRAM

14.1 OBJECTIVE

This program is designed to assist State and local governments in providing themselves with safe facilities in which principal executive officials (including the civil defense directors), their operating staffs, members of the legislative bodies, and the judiciary of State and local governments can carry on their emergency operating responsibilities. It is desirable that all such elements of a government be housed in one main emergency operating center. Where necessary, a limited number of centers may be provided for various elements, or groups of elements, of the government concerned. This situation is most likely to arise in the case of State governments with their large legislatures, or in the case of subordinate emergency operating centers; for example, a State highway patrol post.

14.2 SCOPE

This program is applicable only to governments or elements of government having direct emergency operating responsibilities, regardless of their location. Included within this group are States, counties, and municipalities; health, police, and fire departments, together with their emergency dispatching headquarters; and certain special purpose districts, such as fire districts.

14.3 GENERAL PRINCIPLES

An emergency operating center should provide maximum safety consistent with the operational requirements for which it will be used. It should be constructed to provide protection to its occupants and equipment against such of the effects of air blast, thermal radiation, initial and residual ionizing radiation, including fallout, and of chemical and biological agents as might be expected at its location. As a minimum, this will include protection against fallout radiation and chemical and biological agents. The emergency operating center must have the necessary space, equipment, supplies, and operating records for efficient emergency operations and for prolonged occupancy during periods of intense fallout. Special attention should be given to the required communications equipment and facilities. Provisions should be made for the necessary food, medical, and other supplies, including their storage within the center. This chapter sets forth the minimum requirements necessary for operations and communications capabilities in emergency operating centers, as well as the minimum protective construction required to qualify them for Federal contributions. It outlines the criteria for approval of project applications for emergency operating centers. In developing these applications, the following factors must be considered:

a. *General Outline of Functions.* An emergency operating center is a protected facility in which control of the operating forces of an established government is exercised during emergency periods. Guidance and instructions to the general population during emergency periods also originate here. A main emergency operating center may be developed to house the executive, legislative, and judicial branches in a single structure, or in a limited number of separate structures. Each emergency operating center is a workplace which must have adequate facilities for communication with other operating elements of government. Each should be planned and developed to permit self-contained, continu-

ous, safe occupancy and operation during a civil defense emergency. The daily use of operational space by segments of the government having emergency operating responsibilities is authorized and encouraged. Such use must not jeopardize the operational capability of the facility in the event of an emergency. Facilities of the type considered here can be:

(1) Specially constructed, separate structures;

(2) Protected facilities incorporated in new public buildings for the use of emergency operating elements of government, such as police or fire stations and highway engineering garages; or, in new general-purpose buildings, State office buildings, city halls, and county courthouses.

(3) Where it is structurally feasible and economically practicable, as determined by OCDM, modified existing buildings or improved existing underground space, such as mines and tunnels.

b. *Specific Functions Under Emergency Operating Conditions.* (1) The emergency operating center should be so designed and equipped as to facilitate its performance of the following functions for the State or community concerned after an enemy attack:

(a) Receive and disseminate attack warnings.

(b) Receive and analyze reports of damage in sufficient volume and detail for identification of the type, magnitude, and effects of an attack.

(c) Enable responsible officials to make and communicate valid decisions on the best course of survival or rehabilitation action to be taken, based on analyzed information and reports, preattack and postattack.

(d) Enable officials to communicate promptly with the lower echelons and field forces of the government, and with the next higher echelon.

(e) Provide space and equipment for the storage and use of records essential for emergency operations.

(f) Provide accommodations for the government officials and employees who man the emergency operating center to live in it for an uninterrupted period of at least 14 days.

(g) Provide space for an infirmary area for care and treatment of ill or injured staff members.

(2) Where all elements of a general-purpose government are to be housed in one emergency operating center, provision must be made for:

(a) Accommodations for the legislative body to live and function.

(b) Accommodations for the judiciary to live and function.

14.4 Eligible Costs

a. Federal contributions may be made toward the following costs in connection with the construction of an emergency operating center:

(1) Conducting a preliminary survey, including rough cost estimates, to determine the feasibility of undertaking such civil defense construction. Upon a determination that it is the desire and the intent of the State or local government to construct an emergency operating center, whether consruction is undertaken immediately or within a reasonable time, Federal contributions may be made toward the cost of preparation of the plans and specifications required for such construction. Where a multiuse structure which includes provision for an emergency operating center is planned, contributions may be made toward the cost of only those plans and specifications which are necessary and essential to the emergency operating center portion of such multiuse structure.

(2) Construction, where the structure includes only the emergency operating center; modifications and improvement of existing buildings or underground space where structurally feasible and economically practicable. (OCDM shall determine feasibility and practicability.) Utilities, site preparation, grading, parking facilities, and access roads are eligble costs when determned by OCDM to be reasonable and not disproportionate to the remaining cost of the center.

(3) Costs related to the construction of an emergency operating center in the basement of a multiuse structure, such as a new city hall or county courthouse. The Federal Government will contribute one-half toward the construction cost of the center, only. In determining the cost of the emergency operating center portion of the multiuse structure, computation will be on the basis of additional costs of constructing the emergency operating center as a part of the multiuse structure. Such costs may include the necessary site preparation, excavation, footings and foundations, utilities and alternate utilities, grading, soil stabilization, and other costs to the extent that they are over and above the normal costs

for the multiuse structure concerned. To determine the portion of the building that may be considered a part of the emergency operating center for purposes of contributions, the following two-part test shall be used:

(a) The space involved must be within the protected portion of the building (the protection required is set forth in paragraphs 14.10c and 14.10d, below); *and*

(b) The space must be assigned as working space for an element of the State or local government having emergency operating responsibilities, living space (dormitories, kitchens, washrooms, etc.) for the staff of such elements, or space necessary for supporting functions of the center in an emergency, such as communications, air-conditioning and heating equipment, infirmary, storage of emergency-operating records, corridors, storerooms, and other essential uses.

b. Only one-half of the extra cost of constructing an emergency operating center in a multiuse structure is eligible for matching funds. The State or local government, in addition to paying the remaining one-half of such costs, must bear all of the costs resulting from the addition of space and facilities for nonemergency operating center use. Architect-engineer's cost estimates shall be prepared so as to separate completely the additional costs of constructing the emergency operating center as a part of the multiuse building from the normal construction costs of such a building.

c. Should a training center for civil defense be constructed in conjunction with an emergency operating center, the training center portion of the structure would be eligible for Federal contributions. (See chapter 7.) One project application may be submitted to cover both the emergency operating center and the training center. If any portion of the training center is to be used for operational purposes during an emergency, that portion must meet the same protective construction standards as the emergency operating center.

d. Contributions are available for obtaining and installing such equipment and supplies as are necessary and essential to the development and maintenance of the emergency operational capability of the emergency operating center. Included are: ventilating and air-conditioning systems; kitchen equipment; toilets and emergency sewage disposal systems; reliable emergency water supply systems; infirmary equipment; bunks, lockers, desks, tables, chairs, filing cabinets, map and status boards, telephones; up to 30-day supply of fuel; and similar essential items.

e. Contributions are available for developing and installing a wash-down system for additional radiological protection. Since accurate evaluation of the reduction factor obtained from this technique is not possible with information presently available, no reduction in required shielding mass will be permitted as a result of the installation of a wash-down system.

f. Contributions are available for obtaining military rations sufficient for 14 days' operation of the center when fully staffed. (Note: Military rations are available only through the Office of Civil and Defense Mobilization. A separate project application, requesting Federal procurement, must be submitted for these rations. Regional directors will advise the States in advance of each military procurement of the "5–1" ration and the Individual Combat Meal ration.)

g. The following related costs are also eligible for Federal contributions under other programs as indicated:

(1) The cost of communications equipment, including installation, which is required for the emergency operating center (see paragraph 14.8 and annex 14–A), is eligible under the communications contributions program (see chapter 9).

(2) Warning equipment is eligible for contributions under the warning contributions program (see paragraph 14.9, and chapter 5).

14.5 Ineligible Costs

a. No Federal contribution can be made for the procurement of land, and the value of any land contributed by the State, or any political subdivision thereof, must be excluded from the computation of the State's share of the cost of the project.

b. No Federal contribution may be made for the development of unprotected operating facilities, or for space, facilities, or equipment that does not increase the civil defense emergency operating capability of the government concerned. For protection required, see paragraphs 14.10c and 14.10d.

c. No Federal contributions are available for the replacement of rations after the initial 14 days' supply for the Center.

14.6 PHASING

a. State and local governments may phase the development of an emergency operating center over several fiscal periods under the conditions and in the manner described in this paragraph. To determine the engineering, operational, and financial feasibility of an emergency operating center, a project application may be approved for a preliminary phase, known as phase I, which will cover the preparation of plans and specifications, including both preliminary and working drawings (see paragraph 14.12b); soil borings, analysis, and reports; and detailed cost estimates.

b. If, during the conduct of the phase I work, it becomes apparent that the project will not be feasible, the applicant government may terminate the work, notify the regional office of OCDM that the project has been determined to be infeasible and the reasons for this determination, and return to OCDM one-half of the approved total cost of the project less one-half of the amount expended for approved work under phase I, if an advance of funds was made. If no advance of funds was made, the State may invoice OCDM for one-half the cost of the approved work performed.

c. When a State or one of its political subdivisions has determined that an emergency operating center is feasible and that it wishes to proceed with construction, and it further determines that financial considerations require the phasing of the cost over several fiscal periods, it may apply for a Federal contribution of one-half of the cost of the work which it plans to undertake during its current fiscal year. Such an application must be accompanied, in addition to the materials called for in paragraph 14.12b, by a statement signed by a responsible officer of the government certifying that: (1) it is the intent of the government concerned to provide itself with an emergency operating center with the assistance of Federal contributions, and (2) it has been determined that, for reasons of financial manageability, the project must be phased over several fiscal periods. In addition, there shall be submitted a phasing plan, which shall indicate the work to be accomplished in each fiscal period and the date of completion of the entire emergency operating center, including its equipment and supplies. The applicant government must also show that each proposed phase will result in a substantial increase in, or benefit to, its civil defense emergency capability. The project application for work to be undertaken in each subsequent fiscal period shall be accompanied by a statement that the earlier phasing plan is still in effect. Should modification of the original phasing plan be required by subsequent events, a substitute plan, with a complete justification, shall be submitted.

14.7 PLANNING

a. *Program.* The goal of the emergency operating center program is the provision of facilities which will facilitate the efficient direction of the emergency operation of governments and which will reduce to an acceptable level the calculated risk under attack conditions to the personnel comprising each government.

b. *Organization.* In order to plan an emergency operating center, the emergency functions which will be performed or controlled at that center must be established. Careful estimates may then be made of the workload involved in performing these functions. This will establish the size and composition of the staff to be provided for. It is then a relatively easy matter to design a facility to contain the required staff and functions. Consideration should be given to the development of one emergency operating center to house several governments; for example, a county and its municipalities, or a group of municipalities in a metropolitan area.

c. *Location.* The location of the emergency operating center will be determined by the emergency operating plans and requirements of the government which will use it. Such emergency operating plans must be consistent with the National Plan for Civil Defense and Defense Mobilization as approved by the Director of the Office of Civil and Defense Mobilization. The site chosen will be determined, in part, by the best possible compromise of other important factors, such as the characteristics of the area from a communications viewpoint, and the desirability of having the emergency operating center as close as possible to the normal location of the government, so that the time required to activate the center after a warning is received may be reduced to a minimum. If the center is some distance from the seat of government, consideration should be given to manning it with a skeleton staff as a regular peacetime practice. If a well is to be used for the independent water supply, the availability

of ground water at the site is an important consideration. The recommendations of the State department of health should be sought prior to final selection of the site. If a choice is available, the site offering service from two or more telephone exchanges and having superior radio transmission and reception characteristics should be selected.

d. *Basic Requirements.* Since the emergency operating center must be operational during and after an enemy attack, the structure must provide protection against the effects of an attack. An emergency operating center is essentially a workplace; and, because of the nature of the work, must have communications with other emergency operating elements of government. Therefore, the emergency operating center must provide:

(1) Sufficient workspace for the required staff;
(2) Adequate communications facilities; and
(3) Facilities for the support of the staff and its activities.

14.8 Communications Requirements

a. *Function.* The communications function of an emergency operating center is to provide for the receipt and dissemination of accurate information and direction in a civil defense emergency.

b. *Communications Planning.* Planning for communications should be all-inclusive, i.e., it should provide for the maximum development. Then, if it is necessary to install the equipment in phases, later installations will not conflict with the earlier. Preliminary communications planning must be coordinated with local telephone companies and with qualified radio engineers, to insure that emergency rerouting of circuits is considered and that proper facilities of a standardized nature are employed. All facilities, so far as possible, should be of types that are readily obtainable, and are easy to operate and maintain.

c. *Communications Requirements.* Communications must be provided for the following functions essential to an emergency operating center, although not all of these functions may be required in all such facilities:

(1) Receipt and dissemination of attack warning information.
(2) Operation of sirens and/or public-address systems to alert and convey warning to the public.
(3) Summoning of key personnel for duty when needed.
(4) Maintenance of contact with other emergency operating centers.
(5) Constant two-way communications with police, fire, rescue, health, engineering, and other operating services of government, and with key broadcasting stations.
(6) Control and programing of broadcast stations under CONELRAD and postattack conditions.

d. *Communications Engineering.* General communications engineering guidance for emergency operating centers is contained in annex 14–A of this chapter.

e. *Communications Contributions Program.* For further information on communications planning and equipment, systems-design requirements, and eligibility, see Chapter 9, "Communications Contributions Program."

14.9 Warning Requirements

Facilities must be available to carry out the warning function. So that noise levels may be kept at a minimum, and to avoid contributing to the overall noise levels, provision should be made for a room with sufficient space to house personnel, console-type desks, chairs, maps, charts, and associated warning equipment. Acoustical treatment of walls and ceiling may be required to maintain necessary low-noise levels. Warning facilities should provide for the following:

a. *State Government Emergency Operating Center.* Communications circuits to meet the requirements of the alternate State warning point, with its associated warning equipment. This is the NAWAS equipment and two loudspeakers, a footswitch, a beehive lamp, and a desk or hang-up type telephone. Other warning equipment should consist of another telephone, a microphone for the transceiver, and the centralized controls for the electronic warning devices of the target city (sirens, bells and lights, etc.).

b. *Local Government Emergency Operating Center.* Communications circuits to meet the requirements of an alternate warning point, with its associated warning equipment. This is the NAWAS equipment of one loudspeaker, a ringing key, and a desk or hang-up type telephone. The other warning equipment would be the same as prescribed for the State.

14.10 Structural Requirements

a. *Location* (1) Emergency operating centers constructed inside, or outside, but within 5 miles of the boundary of an aiming area, as delineated by the Office of Civil and Defense Mobilization, must be constructed according to class 1 minimum design criteria, if the targetable feature is one of the following:

(a) Operational bases of the Strategic Air Command and the Air Defense Command, including civil and military airfields, with major servicing and maintenance facilities and hard-surfaced runways at least 7,000 feet in length at mean sea-level equivalent.

(b) Major military command and control headquarters, such as the Pentagon and the headquarters of the North American Air Defense Command, Strategic Air Command, Continental Army Command, and Naval Sea Frontiers.

(c) Major harbors, naval bases, and military supply depots.

(d) Major military installations which house divisions of the General Reserve and the Fleet Marine Force.

(e) Standard metropolitan areas containing population concentrations of at least 150,000 inhabitants.

(f) Areas of high concentrations of industry; Atomic Energy Commission production facilities; major dams; and major power, transportation, communications, and petroleum-handling facilities.

Note: Identification of specific targets within these categories must be made according to the minimum criteria for each target category issued by OCDM.

(2) Emergency operating centers constructed in all other locations must meet class 2 minimum design criteria.

b. *Layout.* (1) *Space Arrangement.* The functional layout of an emergency operating center must be based on the organization to be housed. Special attention should be given to relative location of the branches or elements of the government concerned to reduce traffic inside the center and to increase operating efficiency. The infirmary area should be so located that privacy and, if necessary, isolation are possible. Cooking and main sanitary areas should be located close to sleeping, eating, and off-duty spaces. Machine rooms should be located to obtain maximum reduction of noise and electrical interference. Record-storage facilities should be in or near the part of the center where they will be used. In the arrangement of living quarters, it must be recognized that the emergency operating center, to have assurance of operability, will have to be manned continuously.

(2) *Entrances and Exits.* All entrances should be arranged to provide reasonable security against hazards of sabotage. Facilities should be provided for controlled approach, showing of credentials, and selective admission. At least two exits must be provided for security and for safety against blocking by debris. All entrances and exits should be of such shape, size, and construction as to reduce exterior radiation doses to a level commensurate with the barrier shielding afforded by the basic construction. Air loss should be held to a minimum.

(3) *Decontamination.* At least one entrance should have facilities for decontamination of personnel entering during contaminated conditions. Consideration should be given to equipping this entrance with an air lock. It should have facilities for: (a) laundering or otherwise disposing of contaminated clothing and apparel, (b) showers, (c) dressing, and (d) storage of clean clothing. Showers and dressing rooms will be necessary for both normal use and for decontamination purposes.

(4) *Space Allowance.* Space allowances should be held to a minimum in keeping with the functional nature of the facility. Machine rooms must have adequate space for maintenance of equipment and its removal without extensive dismantling. Sleeping rooms should be arranged with bunks three or four high and with minimal aisles.

c. *Structural Design.* The following minimum structural design requirements represent a maximum calculated risk, and can be achieved at reasonable increases in cost over normal construction.

(1) *Underground versus Aboveground Design.* In general, the cost of construction of emergency operating centers below ground will be much less than the cost of an aboveground facility which would offer comparable protection. Aboveground construction requires designing for reflected blast overpressures and for protection against the greater amount of radiation.

(2) *Blast Loading.* The emergency operating center must provide the following protection:

(a) *Class 1 minimum design criteria.* Design blast loadings of at least 30 p.s.i. peak side-on overpressure, and related reflected pressures as exposures require. Recommended specifications for blast-resistant structural design are included in OCDM Technical Report TR–5–1. Where desired and justified by the applicant government, design blast loading may exceed 30 p.s.i.

(b) *Class 2 minimum design criteria.*—No protection against blast loadings is required. (For locations within 20 miles of an aiming area, it is suggested, but not required, that the design providing fallout radiation protection, as required in paragraph 14.10d, which is developed by standard building practice using static loads, be reanalyzed for blast loadings by the procedure outlined in TR–5–1. This analysis will indicate what strengthening can be accomplished, with little or no increase in cost. A balanced design will insure the structure to be on the verge of collapse for all modes of failure when the maximum strength of the materials are reached. If the applicant desires such protection, use of two feet of concrete rather than equivalent earth for radiological protection will assist in developing blast resistance.) Where desired and justified by the applicant government, emergency operating centers in locations other than those specifically identified in paragraph 14.10a(1) may be designed for blast loadings. Because of their importance to the survival of the Nation, all main emergency operating centers for State governments (i.e., the center housing at least the headquarters of the executive branch of a State government) must meet class 1 minimum protection requirements, regardless of location.

d. *Radiation Protection.* (1) If the emergency operating center is in a location identified in paragraph 14.10a(1), it must provide effective protection against initial radiation from nuclear weapons. The emergency operating center should have a shielding mass, along any straight line to the open air, equivalent to 6 feet 8 inches of earth or 4 feet 6 inches of concrete, and *must* have a minimum equivalent of 4 feet 6 inches of earth or 3 feet of concrete. Frangible construction contiguous to the emergency operating center shall not be considered in computing the shielding mass for initial radiation.

(2) Emergency operating centers in locations other than those specifically identified in paragraph 14.10a(1) must provide effective protection from radioactive fallout as a minimum requirement. The design shall provide for at least 2 feet of concrete or 3 feet of earth, or any equivalent mass between the occupied areas of the center and the outside air. Because present information makes it difficult to evaluate accurate the reduction factor obtainable with wash-down techniques, no reduction in required shielding mass as a result of installing such a system will be allowed.

(3) Radioactive debris and dust must be excluded from the emergency operating center, by appropriate devices, on entrances, ventilating-system intakes, and other building openings. An effective shielding mass must be provided between the contaminated air filters and the rest of the emergency operating center. For design purposes, this shall be considered to be at least 20 inches of concrete.

e. *Chemical and Biological Warfare Protection.* Approved gas-particulate filters shall be provided for removing efficiently chemical, biological, and radiological contaminants from the fresh-air supply to the emergency operating center. Filters for this can be obtained through the OCDM in standard sizes of 600, 1200, 2500, and 5000 c.f.m. of air. The gas-particulate filters may be bypassed when there is no contamination hazard in the vicinity. Particulate prefilters, which remain in service as filters when the gas-particulate filters are bypassed, shall also be provided. The leakage of contaminated air into the ventilating system must be prevented by proper arrangement and installation of the filters and connections.

f. *Interior Treatment.* Interior treatment of the structure should express its utilitarian nature. Acoustic treatment should be limited to those portions of the emergency operating center where noise reduction is essential for operation. Plush fixtures, materials, and finishes should be avoided. The interior of the structure should be as fire-resistant as possible. Painting of walls and ceilings should be used to increase reflection and reduce the lighting powerload.

g. *Utilities.* (1) *General*

(a) The emergency operating center must be self-contained. Under emergency conditions it may be impossible to provide utilities from the outside, due to blast, thermal, or fallout effects. This would be impracticable after an attack, as the facility must be fully operational in the critical first few hours.

(b) From the standpoint of maintenance and emergency repair, the utilities within the emergency location should be readily accessible. All wiring should be in conduit, either exposed or buried; and piping, except soil piping, should be run exposed.

(c) Equipment shall conform to published OCDM specifications, where applicable, and, in the absence of such specifications, to standard commercial product specifications acceptable to the OCDM regional director.

(2) *Light and Power*

(a) One or more standby engine-electric generators shall be provided to carry the maximum demand for power and light. If feasible, power for communications equipment should be balanced with general-purpose power to minimize the effects of fluctuation. Starting and control equipment shall be included for automatically and manually activating the emergency power equipment when public power is disrupted. The engine generators shall be capable of starting the intermittent loads when superimposed on the continuous loads. The engines shall be water cooled without radiators; and, if heat losses are utilized for space heating and domestic hot-water supply, should be cooled by a vapor-phase system. The engines shall be suitable for this method of cooling. The engine generators shall be mounted on vibration-isolating bases.

(b) The general level of lighting provided in the emergency operating center shall be consistent with minimum requirements for the various areas, and supplementary lighting shall be provided where greater intensities are required. The type of lighting and the fixtures shall be utilitarian, but shall have satisfactory distribution characteristics without objectionable glare. Fluorescent lighting may be used only where it cannot interfere with radio and teletype operations, or where filters are provided to eliminate interference.

(3) *Water Supply.* The emergency operating center must be provided with a dependable source of water for domestic purposes and for cooling. This will require the construction of a well and water-supply system or a large storage tank. An individual well supply is preferred. It should be within or contiguous to the emergency operating center, in order to permit maximum protection against sabotage and biological agents as well as against nuclear weapon effects.

(4) *Sewerage.* Provision should be made for emergency waste disposal. The piping system should be so arranged that the changeover can be made within the emergency operating center. Where discharge lines to sanitary sewers are of such large size as to permit a possible buildup of overpressure, a suitable valve to prevent backpressure should be provided.

(5) *Plumbing Fixtures.* Plumbing fixtures should be of utilitarian design and finish. The following ratios of fixtures to the total emergency operating staff are suggested:

Water closets: one per 10 persons (preferred); one per 15 persons (allowable under certain circumstances and for larger centers)
Urinals: one per 25 males
Lavoratories: one per 25 persons
Showers: one per 75 persons
Drinking fountains: one per 75 persons
Slop sinks: one per 100 persons

(6) *Heating, Ventilating, and Air Conditioning*

(a) *General.* An air-conditioning system capable of maintaining the environmental conditions necessary for continuous and effective operation of the emergency operating center shall be provided. This system shall include equipment for the control of temperature, humidity, air distribution, oxygen depletion, carbon dioxide concentration, and noxious, toxic, pathogenic, and radioactive air contaminants. In general, the design and installation of the system and its component parts shall conform to good practice as defined by the latest edition of the "Heating, Ventilating, and Air Conditioning Guide," published by the American Society of Heating and Air Conditioning Engineers; and to the

"American Standard Safety Code for Mechanical Refrigeration," ASA–B9.1, sponsored by the American Society of Refrigeration Engineers. The system shall be strictly utilitarian, with major consideration given to reliability, safety, simplicity, performance, and cost rather than to aesthetic values of optimum comfort. Design of the system will be influenced by local conditions and, in particular, by the temperature and adequacy of the emergency water supply.

(b) *Air-Conditioning Design Requirements.* The air-conditioning system shall preferably be of a central-multizone or central-unitary type, with major apparatus installed in a mechanical equipment room.

(i) The ventilating equipment shall supply not less than 15 c.f.m. of conditioned air per person to the occupied spaces, of which the amount of fresh air shall not be less than:

3 c.f.m. for each person at rest
5 c.f.m. for each active person

(ii) Exhaust ducts from the infirmary area, toilets, showers, kitchens, equipment or utility rooms, decontamination facilities, and air locks shall be so arranged as to prevent return of air before passing through the conditioner. In order to prevent infiltration of contaminated outside air, an oxerpressure of not less than 0.25 inch of water shall be maintained in the building. Additional fresh air shall be provided for these or other special purposes, if necessary.

(iii) The heating equipment shall be capable of tempering the fresh air supply to 70° F. in occupied areas, and 60° F. in utility or storage areas, when the outside air is at the normal winter design temperature. The above performance shall be attainable when the building is not occupied. Heating capacity shall also be provided for the domestic hot-water supply to lavatories, showers, and sinks.

(iv) The cooling and dehumidifying equipment shall be capable of maintaining an effective temperature of not more than 76° F. in operating areas, and 78° F. in bunking or service areas. For design purposes, a maintained condition of 80° F. dry-bulb temperature and 60 percent relative humidity may be assumed for all occupied areas. The temperature in equipment rooms shall not exceed 95° F., and supplementary cooling shall be provided, if necessary. The cooling loads shall include heat loads due to full occupancy, fresh air, lighting fixtures, heating appliances, power and communications apparatus, and other internal heat sources.

(c) *Air-Conditioning Equipment.* The air-conditioning system shall make the best use of those resources which will be available during an emergency. If the development of a well for cooling and potable water is impracticable, consideration must be given to substitute methods for cooling, such as stored water, stored ice, earth-conduction coils, or air-cooled condensers. Air-cooled or evaporative condensers may be used only if special provisions are made for blast protection in class I locations. The following list of major equipment is illustrative of the general requirement, but does not necessarily restrict the choice or design of the air-conditioning system:

(i) A central multizone air-conditioning unit, with centrifugal fans, electric motor drive, cooling coils, heating coils, and control dampers.

(ii) A fresh-air blower of either the positive-displacement rotary or the centrifugal type, with electric motor drive. (This blower must maintain a constant supply of filtered fresh air against a highly variable flow resistance.)

(iii) Particulate filters for recirculated air.

(iv) Activated carbon filters for recirculated air.

(v) Prefilters for fresh air (also serve as fresh-air filters when gas-particulate filters are bypassed).

(vi) Gas-particulate filters for fresh air, with bypass piping and valves (see paragraph 14.10e, "Chemical and Biological Warfare Protection").

(vii) An auxiliary air-cooling unit for the engine-generator room.

(viii) Automatic-control apparatus and central-control panel, with operating instructions.

(ix) Water and waste piping and valves.

(x) Distribution ductwork, dampers, and outlets.

(xi) A hot-water storage tank, with electric-immersion heater.

(xii) Blast valves or closures for air intake and exhaust opening in class 1 locations.

(xiii) Special equipment and tools required for maintenance, including apparatus for servicing air filters.

(xiv) A mechanical water-chilling unit or heat pump. (Required for supplementary cooling if emergency water supply is inadequate or too warm for effective air cooling and dehumidifying, or if a heat pump can be used to advantage for winter heating.)

(xv) A shell-and-tube heat exchanger, heat-recovery muffler, steam separator, and hot-water circulating pump. (Required if diesel-engine heat losses are utilized for space heating and domestic hot-water supply by operation on a vapor-phase cooling system.)

14.11 Supply Requirements

No project application for an emergency operating center, except an application for a phase I planning project, will be approved unless accompanied by a list of the supplies required by the center for 14 days of continuous emergency operation without contact with the outside, together with an agreement signed by a responsible official of the government concerned that such inventory of supplies, with the exception of food supplies or rations, will be maintained in the center at all times. Included are fuel, medical supplies, housekeeping supplies, and operating supplies, such as paper, pencils, and spare parts for the communications equipment. Fuel and medical supplies sufficient for up to 30 days' operation are eligible for Federal contributions (see paragraph 14.4, "Eligible costs"). Where the government concerned phases the construction of the emergency operating center over several fiscal periods, the required supplies need not be purchased or installed in the center until all construction work is completed. All such supplies must be procured and installed in the center within one year of completion of construction. While the storage of at least 14 days' supply of food in the center is not required, space and facilities for storage must be provided.

14.12 Application Procedure

Preparation of the project application must be in accordance with the procedures set forth in chapters 1, 2, and 3 of this manual, as modified in this chapter. Particular attention should be paid to bid procedures. Two certified copies of bids must be submitted to the appropriate OCDM regional office, which will forward one copy to the OCDM Operational Headquarters. Part III of a project application for an emergency operating center shall consist of the narrative and graphic material specified below.

a. To permit adequate appraisal of a proposed project, application for phase I of the project must be accompanied by the following:

(1) A block diagram showing the chain of command and setting forth the position of the governmental unit which will use the emergency operating center in relation to the next higher echelon of government and to the coordinate and subordinate elements of government.

(2) A chart of the organization of the governmental unit which will use the emergency operating center. This chart must employ the constitutional, statutory, civil service, or other official title of the head of each organizational unit; the number of people per shift in the unit; whether regular government officials, employees, or auxiliaries; and, if it is not apparent from the title of the head of the unit, a brief explanation of the emergency function of the unit.

(3) A brief statement of the plan of operation of the emergency operating center.

(4) A brief statement of the relationship between the operations of the proposed emergency operating center and other centers in any integrated system.

(5) A diagram showing the communications to and from the emergency operating center, with:

(a) communications points and agencies involved;

(b) wire facilities and/or radio frequencies for each circuit;

(c) alternate means of communications to be used if those of the emergency operating center become inoperable.

(6) A statement describing briefly the studies made of communications capabilities for the proposed site, and the results.

(7) A map, in duplicate, at a scale of 1:500,000 (available from the U.S. Geological Survey) showing the proposed location of the facility in relation to the State, county, municipality, or other areas it will serve. This map is best adapted for use where the facility is in a rural area. Where the facility is in

an urbanized area, the map should be at a scale of 1:24,000 (also available from the U.S. Geological Survey), or equivalent, showing the proposed location of the facility in relation to the urbanized area and county.

(8) If the emergency operating center is not to be at the same site as the facility for normal operation of government, a statement, with an attached map, describing available transportation facilities and arrangements for movement to and from the emergency operating center, including detailed estimates of the time required to activate the center after a warning is received.

(9) A statement of the degree of safety of the proposed structure from fire and flood. Consideration should be given here to both preattack and probable post attack conditions.

b. Before working drawings are prepared, the following shall be submitted to the OCDM regional office:

(1) Preliminary drawings of the proposed emergency operating center, including at least:

(a) Single-line plans, showing principal dimensions and space allocations, both for emergency and for normal peacetime operations.

(b) One major cross-section, showing floor, wall, and roof construction, and one detailed wall section; if the emergency operating center is to be in a multiuse building, these sections must include the entire building and show construction of all floors and roof.

(c) Diagrammatic mechanical and electrical plans, showing *general* layout of the systems, as well as locations and capabilities of *principal* items of equipment, including communications equipment. Emphasis should be on specialized features of systems as contrasted with standard elements, such as electrical distribution or piping.

(2) An outline specification, giving design criteria and types of materials proposed.

(3) Report on proposed water supply and sewage disposal systems, including:

(a) A description of the proposed location of a well for water supply and a sketch showing the relation between such location and any existing or potential sources of contamination.

(b) A summary of the investigations leading to the conclusion that an ample and satisfactory water supply is available, and a statement from the State department of health supporting the conclusion. If an on-site well cannot be obtained, a description of the alternatives which are contemplated and a statement as to why a more suitable site is not available.

(c) A description of the proposed method of sewage disposal and a concurring statement from the State department of health.

c. To permit adequate appraisal of subsequent phases, construction, and equipment of the center, the following will be submitted to the OCDM regional office:

(1) Complete working drawings and specifications for the emergency operating center, including cross sections, wall sections, elevations, and detailed mechanical and electrical plans. If the center is to be in a multiuse building, general plans and specifications for the entire building must be submitted, clearly marked to show the portions of the structure and utilities comprising the emergency operating center.

(2) Phasing plan, if any, clearly setting forth the portion of the emergency operating center to be constructed upon approval of the project application, and the proposed phasing of the remainder of the center. This phasing plan must be accompanied by a statement, signed by a responsible official, that it is the intent of the government concerned to provide itself with a complete emergency operating center, as required by paragraph 14.6, "Phasing."

(3) A cost estimate for the complete emergency operating center, supported by estimates for each proposed phase of construction. These estimates must be submitted by type of work, i.e., general, mechanical, electrical, heating and ventilating, etc. In the case of a multiuse building, the estimates shall show the total costs for the entire building and for the emergency operating center.

(4) Estimates of the time required:

(a) to complete the phase of construction applied for after approval of the project application.

(b) until each subsequent phase (if any) project application will be submitted.

(c) for completion of the entire emergency operating center, including all equipment and supplies.

(5) The 14-day supply inventory and agreement required under paragraph 14.11, "Supply Requirements."

14.13 INSPECTION

a. Each project application, except an application for phase I (paragraph 14.12a) shall include a cost item for inspection of construction by a registered architect or engineer to assure conformance with the OCDM-approved designs and specifications. This may be the same architect or engineer who prepared the plans and specifications, or some other registered architect or engineer at the option of the government concerned.

b. Not later than ten days after receipt of approval of a project application (except for phase I), the applying government shall furnish the appropriate OCDM regional office the name, State of registration and registration number, and the business address of the architect or engineer retained to make the required inspections and certifications.

c. During the life of the construction contract, the applicant shall submit, through the State, monthly progress reports, in duplicate (by the tenth of each month), to the appropriate OCDM regional office. The monthly progress report of construction made by the architect-engineer to the applicant government will be acceptable. Accompanying this monthly report to OCDM shall be a certification by the architect-engineer that the work completed to date conforms to the plans and specifications approved by OCDM. One copy of the report will be retained by the regional office and the other forwarded to the OCDM Operational Headquarters.

d. Based upon the monthly reports submitted, the State or local government constructing the emergency operating center may, at its option or if the construction contract so provides, make partial payments to the contractor or contractors concerned for the work performed. Not more than 90 percent of the contract price may be so paid prior to completion of all work under the contract, and payment in full may not be made until the appropriate OCDM regional office has received an affidavit from the architect-engineer, certifying that the work has been completed and is in conformity with the designs and specifications approved by the Office of Civil and Defense Mobilization.

OPERATING CENTERS ESTIMATE FOR 1963

Mr. OSTERTAG. What I think the chairman was attempting to arrive at, is on the basis of your justification there seems to be considerable ifs and ands or guess work about it, but certainly there must be some basis for your arrival at the $8 million figure in your justifications. That I think is the essential thing.

Mr. BURNS. It is the amount necessary to match the money the States say they will have available.

In other words, we proceed on the basis that the States and localities are prepared next year to put up so many dollars. We believe there is a little unintended inflation. We come to an amount which seems necessary to match the programs we estimate that they will undertake.

Mr. OSTERTAG. Are these firm commitments?

Mr. BURNS. Most of them are commitments already made.

Mr. DURKEE. I could read off a list if you would like, Mr. Ostertag.

Mr. PITTMAN. I do not know that we have been asked for the list of them.

Mr. DURKEE. I mean the total.

Mr. PITTMAN. The point we should make clear is that this is an application-type program. We do not determine how this money will be spent until we get an application in. Therefore, the if's, and's, and but's are due to the fact that we do not have the applications in.

Mr. OSTERTAG. You do not pick the $8 million out of the blue. You must have arrived at that on some basis. I think that is what we are trying to determine—how do you know it will take 8, 10, 20 million dollars or what the figure might be?

There certainly is some reasoning and logic out of your $8 million. It is not by guess, is it?

Mr. PITTMAN. No. We will give you the details here.

Mr. DURKEE. The estimated additional costs, i.e., the Federal share of those emergency operating centers already under development adds to an estimated figure of $4,351,300 as of March 6, 1962. If the States, counties and cities that have started these continue, we will be obligated, provided they meet the criteria established by us, to meet those expenditures. We estimate that $2,700,000 of these requirements will be financed from 1962 funds currently available, leaving $1,651,300 to be funded from the 1963 budget request. The remainder of the 1963 request, $6,348,700, is to fund the initial cost of new development, new starts, for which there are indications from 6 States, 15 counties, and 12 cities that they wish to undertake these programs. This totals 33 anticipated new starts at this time compared to 25 estimated at the time the budget justifications were prepared. A list of these anticipated 1963 starts follows:

New starts anticipated for fiscal year 1963

	Type of Protection
States:	
New York, areas 1, 2, 3, and 4	
Rhode Island	Blast.
North Carolina	Fallout.
Texas No. 2	Blast.
South Dakota	Fallout.
Kansas	Blast.
Counties:	
Kay, Okla	Fallout.
McCurtain, Okla	
Woodward, Okla	Do.
Cass, N. Dak	Do.
Napa, Calif	Do.
San Francisco County-city, Calif	Blast.
Beaver, Utah	Fallout.
Davis, Utah	Blast.
Salt Lake, Utah	Do.
Utah County, Utah	Fallout.
Webber, Utah	Blast.
Montgomery, Md	Do.
Washington, Md	Do.
Pinellas, Fla	Do.
Guilford, N.C. (Greensboro)	
Cities:	
Goldsboro, N.C	Fallout.
Rapid City, S. Dak	Do.
San Joaquin, Calif	Blast.
Hayword, Calif	Do.
Livermore, Calif	Do.
Marysville, Calif	Do.
Modesto, Calif	Fallout.
Mt. Shasta, Calif	Do.
Redding, Calif	Do.
Yreka, Calif	Do.
Apopka, Fla	Do.
Park Forest, Ill	

Mr. THOMAS. Can you give us an opinion of what the program will cost in its entirety if the cities of 100,000 or larger in the United States will take advantage of this program?

Mr. DURKEE. I think we could not make any kind of overall estimate of that kind, Mr. Chairman, because of the initiative being in the

hands of the States, cities, and counties themselves. I think you could anticipate that we will get the level of participation here that we have for this year.

Mr. THOMAS. If this is going to save lives how can you make that statement? People in X town want to live as badly as people in Y town. If X town has it, why shouldn't Y town have it?

Mr. DURKEE. I anticipate a continuing request for matching Federal funds for this purpose.

Mr. THOMAS. What will it cost?

Mr. PITTMAN. Another thing that would make me very cautious about giving a response to your question, we first want the returns on the national survey of all existing buildings, which will tell us which of these buildings with existing fallout space are State-owned buildings.

Mr. THOMAS. Let us defer this whole program until you make up your mind and have some definite views on the matter.

Mr. PITTMAN. We are not in a position to survey the total requirements for State government protection in buildings until we complete the national survey that is now going on.

PERSONNEL AND ADMINISTRATIVE EXPENSES

Mr. THOMAS. I call your attention to "Personnel, administrative expense," $18 million.

I have a note here which says, "How many new jobs and how many jobs on board now?" I think I can answer my own question. You started out before we implemented this section 205 with about 2,500 people in the cities and counties and the States and they were paid with their own funds. Now you have in round figures 3,900 or 4,000, which are paid 50–50, with Federal funds. Now you are seeking $18 million and I have a note here that says, "$5.5 million for the State and $12.5 million for the city hall."

CURRENT AND PROPOSED STAFFING

How many new jobs will that provide over and above the 4,000 you already have now?

Mr. DURKEE. The figure as of March 1, Mr. Chairman, is 4,230 people under the matching funds program.

Mr. THOMAS. I underestimated you.

Mr. DURKEE. Fifty States and eight hundred and fifty-four political subdivisions within those States participate as of March 1, 1962.

Mr. THOMAS. What will this $18 million increment for this year do? How many new jobs will that get in addition to your 4,200?

Mr. DURKEE. We anticipate about a 50-percent increase based on returns that we have already gotten from each State. We have sent out a questionnaire to each State asking them for the status of their civil defense request.

Mr. THOMAS. That will be around 6,300 or 6,400 jobs.

Mr. DURKEE. I would think so.

Mr. ROMM. For the record, the States estimated they would contribute in fiscal year 1963, $22.6 million for personnel and administrative funds. We estimate this is optimistic; $18 million is our estimate of what they can absorb in 1963.

Mr. THOMAS. The law is 50–50. You do not expect them to go higher than the law.

METHOD OF DETERMINING CONTRIBUTION

Mr. OSTERTAG. How do you expect them to match the $22 million that you say will be appropriated by the States with $18 million?

Mr. DURKEE. We do not match dollar for dollar. It is based on a complicated formula, which is written into the law; it is allocated to each State on the basis of population and other factors. In actual fact, the States are spending more on civil defense than our contribution.

Mr. THOMAS. At the end of 1963 what will be the Federal contribution for these 6,300 or 6,400 jobs, on an annual basis, assuming it is frozen there; but it won't be frozen, we know.

What will it be for 1964 assuming the figure is not increased?

Mr. DURKEE. We are asking for $18 million in fiscal year 1963.

Mr. PITTMAN. On your assumption it will be $18 million.

Mr. THOMAS. It won't be increased a bit?

Mr. PITTMAN. I do not know, sir.

Mr. DURKEE. Not on your assumption.

Mr. BURNS. That is figured from an average salary of $4,904 per State job and there will be approximately 1,760 State jobs; plus $3,945 for the average local jobs. We figure 4,950 such local jobs in 1963.

SALARIES

Mr. THOMAS. That is the average. What are you paying your top people?

Mr. BURNS. We would have to give you a table for the record of the principal ones.

Mr. THOMAS. That would be for the States and cities.

Mr. BURNS. The salary is set by the State itself.

Mr. THOMAS. Can you give us an opinion of about what it is?

Mr. BURNS. Subject to correction I would say they paid an average director somewhere in the neighborhood of $9,000 for a medium size State and higher for the large States. (Top salaries in 12 States averaged $9,080; in 11 cities, $7,466.)

Mr. THOMAS. What do the top people in City Hall get?

Mr. BURNS. Somewhere around $7,000 but the average salary is only $3,945 for all people.

QUALIFICATION FOR EMPLOYMENT

Mr. THOMAS. Whose employees are these?

Mr. BURNS. They are State and local employees appointed under the merit systems. We administer that control through a contract with the Department of HEW. We screen the records of appointments. We audit the records to see that these people are qualified under the merit system. We have had good reports that the program of qualification is making headway.

Mr. THOMAS. Are these people under the civil service system?

Mr. BURNS. Yes, sir, with minor exceptions they are. The director himself need not be.

Mr. THOMAS. State civil service or Federal civil service?

Mr. BURNS. State or local.

Mr. THOMAS. They are not under the Federal civil service retirement fund, are they?

Mr. BURNS. They are not. They are subject to the Hatch Act provisions, however.

Mr. THOMAS. Who does the hiring or the firing?

Mr. BURNS. The State and city in accordance with established civil service plans and procedures.

Mr. THOMAS. Do you have any veto over the hiring or the firing of any of them?

Mr. BURNS. Not of an individual, but we can through the audit process disallow payments for anybody hired outside of the system, who should not have been hired.

Mr. DURKEE. I would add, Mr. Chairman, for 15 States for which there are statistics in the merit system, once it was put into effect, it has resulted in a turndown or a rapid turnover of personnel. For example, summary reports of open competitive examinations for civil defense agencies in 1960 and 1961 show that in 15 States where 1,333 took the examination, 820, or approximately 60 percent failed to qualify for employment. In 33 States for which we so far have reports, 656 already hired civil defense employees were examined and 15 percent failed the examinations and were dismissed. We are getting a better level of employees now.

Mr. OSTERTAG. What do you do in a State or locality where they have no actual real civil service or merit system?

Mr. DURKEE. They have to in order to qualify for matching funds.

Mr. MANNING. They can make arrangements to be serviced for the merit system requirements through the State merit system and all States have a merit system established.

MANAGEMENT PROGRAM

Mr. THOMAS. Let us take up the matter of Administrative Expense. Insert pages 40 and 41.

(The pages referred to follow:)

Management program summary

	1961 actual	1962 estimate	1963 estimate
Number of permanent positions		1,148	1,148
Average number of all employees		1,065	1,174
Personnel compensation and benefits		$9,823,700	$11,048,000
Travel		$673,300	$1,000,000
Other supporting costs		$1,738,712	$2,552,000
Total obligations		$12,235,712	$14,600,000

This budget program includes the salaries and supporting costs of a small technical staff in the Office of Civil Defense administering the nationwide civil defense program. To hold the staffing requirements for administering the expanded programs to a minimum and carry out the policy stated in Executive Order 10952 concerning maximum use of existing capabilities and facilities, arrangements are being made with other elements of the Department of Defense for the performance of certain functions for the Office of Civil Defense on a reimbursable basis. Examples of such services include payrolling, voucher ex-

amination, warning and communications, procurement and supply activities, administrative services, and other common support-type activities.

To provide minimum civil defense staffing the fiscal year 1962 permanent position level of 1,148 has been extended through fiscal year 1963. The average number of 1,174 includes 1,136 man-years for permanent employees and 38 man-years of temporary, part-time, and intermittent employment. Future requirements for positions will, of course, depend on the extent to which services are furnished by the military departments with employees on their payroll, but on a reimbursable basis. However, the requirement for funds in the Civil Defense appropriation would still exist for these services. The amount for other supporting costs includes provision for the performance of essential supporting services, either by reimbursement to other departments or by augmentation of the OCD staff.

It is important to note that $1,225,000 of the estimated increase in administrative costs is due to reflection in fiscal year 1963 of full-year expenses of employees included for only 11 months in fiscal year 1962 (Aug. 1, 1961–June 30, 1962). Therefore, the actual increase on an annual base amounts to only $1,135,000, a very small percentage when compared with the increase in the size and magnitude of the program that is being executed in fiscal year 1962 and planned for fiscal year 1963. The substantial increase in the shelter program and the Federal matching contributions program will have a significant effect on the requirement for administrative personnel. The shelter program will, in addition to requiring administrative support from the Corps of Engineers, the Bureau of Yards and Docks, and other Government agencies, require additional personnel for the initial review and followthrough of the applications for funds for the various types of activities included in the overall shelter program. The impact of a 50-percent increase in the contributions program will be felt at all levels, but particularly at the regional office level. There will be an increased requirement related to review and approval of project applications as well as in the fiscal area related to allocation of funds and payment of contracts.

To keep apace with the increased need for Federal staff support of greatly accelerated civil defense programs at State and local level, the personnel distribution of the Office of Civil Defense is being realined by transfer of a significant number of positions from headquarters to field activities. These new field positions are being assigned to the regional offices and training schools, concentrating on shelter program guidance, education, and public information. Present staffs are totally inadequate for the onsite administration that these programs require. Field capability is needed not only to assure local understanding and participation, but also to adapt overall plans and techniques to local conditions and needs.

The costs of supporting services of other agencies assisting in administering the shelter program has been included as a part of the budget estimate for the total shelter program in fiscal year 1962 and fiscal year 1963.

AVERAGE EMPLOYMENT

Mr. THOMAS. I have here, "Where is your other objects?" You are silent on that. "Permanent positions for 1962 and 1963 is 1,148. I notice the salary costs go up. Personnel compensation and benefits is $9,823,700 for 1962 and goes up to $11,048,000 in 1963. I have a penciled note here, "Employment actually increases by 109."

Mr. MCKINNEY. You are using the average now.

Mr. THOMAS. You have not had a salary increase and you have 1,148 jobs for both years; yet you go up over $1,200,000.

Mr. MCKINNEY. We are paying 1,148 people for only 11 months in 1962.

Mr. THOMAS. You haven't heard of our rule of no annualizing, have you? That is just exactly what you are doing.

Mr. JOHNSON. These employees were carried by OCDM and paid from funds that were not transferred to the Department of Defense for the first month of fiscal year 1962. Under the budget instructions OEP picked up the salary and reflected these costs in their budget for the month of July.

Mr. THOMAS. That is still annualizing. You have one way out.

(Discussion off the record.)

OTHER OBJECTS OF EXPENSE

Mr. THOMAS. Where are your other objects, gentlemen?

Mr. MCKINNEY. We have those that we can submit for the record, Mr. Chairman.

Mr. THOMAS. Travel is listed here. It jumps from $673,000 to $1 million, other supporting costs from $1,738,712 to $2,552,000. You have a salary cost of $11 million and other objects cost of $3½ million. That is around 33 percent for other objects, which is considerably high, is it not?

Mr. MCKINNEY. A considerable portion of that is to pay for services we expect to get from other parts of the Defense Department.

Mr. THOMAS. You do not give us any breakdown on that.

Mr. MCKINNEY. We have it. I will take all the blame for not having submitted it sooner. We do have the detail and we would be glad to submit it for the record.

(The information submitted follows:)

Other objects of expense—Management program summary

	1961	1962	1963
HEADQUARTERS ADMINISTRATIVE SUPPORT			
Transportation of things:			
Parcel post	$81,000	$83,000	$152,000
Movement of household effects	11,647	48,000	48,000
Other transportation	27,905	28,000	28,000
Rent, communications, and utilities:			
Rental of equipment	31,355	30,000	33,000
Postage	51,571	51,000	32,000
Toll calls and TWX	37,692	38,000	38,000
Telephone services	113,362	116,000	116,000
BC–DC code lines	125,241	146,000	----------
Printing and reproduction: Administrative printing	111,021	120,000	115,000
Other services:			
Maintenance of buildings and administrative equipment	44,000	30,000	15,000
Guard services	45,675	46,000	10,000
Switchboard operators	39,234	39,500	10,000
Syndicated news services	3,694	4,000	4,000
Administrative surveys	17,911	21,000	21,000
Training costs under Public Law 507	11,245	5,000	10,000
DHEW merit system contract	117,000	146,500	178,000
Payroll, voucher examination, and disbursing services from Army Finance	----------	40,000	108,000
Legal advice from OSD General Counsel	----------	30,000	90,000
Public information support from OSD Public Affairs	----------	----------	310,000
Printing services from TAG	----------	28,712	90,000
Legislative liaison support from OSD	----------	----------	25,000
Communications and warning support from DCA	----------	----------	200,000
Stockpile management from DSA	----------	----------	135,000
Supplies and materials:			
Office supplies	42,165	46,000	46,000
Office duplicating supplies	22,271	25,000	25,000
Commercial reference publications	10,757	10,000	10,000
Newspapers and periodicals	17,037	17,000	17,000
Operational maps and communication supplies	20,021	18,000	15,000
Printing supplies	47,037	45,000	45,000
Equipment:			
Office furniture and furnishings	22,252	25,000	30,000
Office machines	16,620	15,000	13,000
Books	8,139	10,000	10,000
Subtotal, Headquarters administrative support	1,075,852	1,261,712	1,979,000
REGIONAL ADMINISTRATIVE SUPPORT			
Transportation of things:			
Parcel post	6,910	----------	----------
Movement of household effects	8,468	12,000	12,000
Other transportation	16,781	12,000	12,000
Rent, communications, and utilities:			
Rental of space	52,488	53,000	53,000
Toll calls and TWX	99,544	96,000	96,000
Telephone services	82,241	83,000	83,000
Miscellaneous rentals and communications maintenance	8,210	12,000	6,000
Utility services	10,242	9,000	9,000
Printing and reproduction: Administrative printing	15,602	14,000	14,000
Other services:			
Construction changes	54,919	----------	55,000
Maintenance of buildings and administrative equipment	29,303	16,000	28,000
Guard services	----------	30,000	----------
Exhibits and graphics	12,234	15,000	30,000
Supplies and materials:			
Office supplies	42,732	35,000	46,000
Office duplicating supplies	30,814	24,000	27,000
Commercial reference publications	1,247	1,000	1,000
Briefing and promotional supplies	9,156	9,000	12,000
Equipment:			
Office furniture and furnishings	23,561	26,000	33,000
Office machines	11,417	14,000	25,000
Briefing, promotional, and communication equipment	7,790	16,000	31,000
Subtotal, regional administrative support	523,659	477,000	573,000
Grand total	1,599,511	1,738,712	2,552,000

UTILIZATION OF DEPARTMENT OF DEFENSE RESOURCES

Mr. THOMAS. That really comes under the shelter program where you use six or eight services from different parts of the Department of Defense for it.

Mr. MCKINNEY. No, sir. Mr. Holt can answer that.

Mr. THOMAS. Is that in addition to this?

Mr. MCKINNEY. Yes, sir.

Mr. THOMAS. How much does that total include for your transfer to other agencies or other branches in the Department?

Mr. HOLT. I think we can explain that, Mr. Chairman, by giving you a very brief rundown on the program, the utilization of other DOD resources.

Mr. THOMAS. We have already read that. All we are looking for now is the cost.

Mr. HOLT. It is the total cost of transfers that we have made to other DOD agencies in order to provide services or functions for the Office of Civil Defense?

Mr. THOMAS. Yes. What does it amount to?

Mr. MCKINNEY. About $1 million out of this that will go to other elements. It does not include the Corps of Engineers.

Mr. THOMAS. That is part of your other objects, then?

Mr. MCKINNEY. Yes, sir.

Mr. THOMAS. Which runs $3½ million?

Mr. MCKINNEY. 2½ million. You are annualizing again.

Mr. THOMAS. You have travel and other supporting objects, $2.5 plus $1 million.

Mr. MCKINNEY. In the list referred to we are only talking about $2.5 million. The $2.5 million is the only part used for the transfer of these funds to other agencies.

Mr. THOMAS. Did you use the $2.5 million in the transfer?

Mr. MCKINNEY. Approximately $1 million will be transferred in fiscal year 1963.

Mr. THOMAS. What are the other items?

Mr. MCKINNEY. Rents, printing, supplies and materials, equipment, communications.

INCREASED TRAVEL COSTS

Mr. THOMAS. How much is there for furniture? You have $1 million worth of travel. What was your travel bill for 1959, 1960, and 1961? In 1962 you have listed here $673,300.

Mr. MCKINNEY. What we have to do to give you a fair comparison is this——

Mr. THOMAS. You have the same number of personnel as you had last year. Your travel jumps from $673,000 to $1 million. That is a sizable increase for the same number of people.

Mr. MCKINNEY. We have just reprogramed some more money to the travel, because of maintaining two headquarters, the travel has been substantial.

Mr. THOMAS. What was your budget estimate for travel last year?

Mr. MCKINNEY. The amount we got from OEP—you mean 1961?

Mr. THOMAS. 1962.

Mr. MCKINNEY. It includes the reprograming. It is now about $800,000.

Mr. THOMAS. What was your budget estimate for 1962 for travel?

Mr. PITTMAN. We did not have an estimate. We acquired funds the Bureau of the Budget gave us from OCDM. In negotiating out the reorganization, we split it.

TRAVEL LIMITATION

Mr. THOMAS. We want to call your attention to a provision in this bill. You are limited to your budget estimate or less. You cannot reprogram your travel money. Are you familiar with that?

Mr. PITTMAN. In other words, we are stuck with the OCDM estimate for fiscal year 1962. Is that what that means?

Mr. THOMAS. No. It was not included in this bill. I do not know whether the others carried that or not.

Mr. OSTERTAG. Did the transfer exceed last year's budget estimate?

Mr. MCKINNEY. It was less.

Mr. THOMAS. Do you carry the same limitation in the DOD?

Mr. OSTERTAG. Yes.

Mr. THOMAS. He said he is going to reprogram. You had better look it up to see if you are on sound grounds or you will have the Bureau of the Budget and GAO on you.

Mr. HOLT. Our General Counsel says we are.

Mr. PITTMAN. We will check it to make sure.

Mr. MCKINNEY. This $800,000 is only for 11 months in fiscal year 1962, compared to a requirement for 12 months in fiscal year 1963.

Mr. OSTERTAG. Are all of the limitations in the Defense Appropriation bill applicable to the civil defense part of the Defense Department?

Mr. MANNING. Yes, sir. They are.

Mr. OSTERTAG. In other words, whatever the other committee writes in will work here.

Mr. THOMAS. Is my memory correct, gentlemen, as far as this bill is concerned?

Mr. YATES. I think so.

Mr. OSTERTAG. Yes.

Mr. THOMAS. The limitation is the budget estimate.

Mr. OSTERTAG. You mean the original OCDM?

REASON FOR INCREASED TRAVEL

Mr. THOMAS. Why this increase, gentlemen, of about $325,000 travel? How many people do you have in travel status out of your 1,100?

Mr. HOLT. Right now, sir, with the staff split between headquarters in Washington, D.C., and Battle Creek, where the majority of our staff is located at present, we currently have in travel status an average of about 70 headquarters people a month.

HEADQUARTERS EMPLOYMENT

Mr. THOMAS. Break down these 1,148 positions. We showed how many you have in the District of Columbia. How many do you have in your seven regional offices?

Mr. HOLT. Yes, sir; our planning figures——

Mr. THOMAS. How many do you have in the Battle Creek area?

Mr. HOLT. You mean during the month of March, sir, or what we have planned?

Mr. THOMAS. How many will you have in fiscal year 1963?

Mr. HOLT. In 1963, sir, we are planning on headquarters staff in Washington, D.C., of 448 people.

Mr. THOMAS. That is already in the record.

Mr. HOLT. Yes, sir.

Mr. THOMAS. Isn't there a limitation in that bill of 310?

Mr. HOLT. Wasn't that under——

Mr. MANNING. That runs to the Office of Civil and Defense Mobilization. There was a limitation of 310.

Mr. HOLT. At that time there was.

Mr. THOMAS. If you split it up into two parts that limitation would be in round figures 155, then for the District. You have 448.

Mr. PITTMAN. You understand we merged headquarters in Washington. We are pulling all headquarters people out of Battle Creek.

Mr. THOMAS. Are you going to discontinue Battle Creek?

Mr. PITTMAN. No.

Mr. THOMAS. How many people will you have in Battle Creek for fiscal year 1963?

Mr. HOLT. There will be approximately 73 people in all of our field schools. In Battle Creek there will probably be about 36 people, sir.

Mr. THOMAS. In other words, you are moving your personnel out of Battle Creek, except for your school and you will have only 36?

Mr. PITTMAN. That is right.

NUMBER AND LOCATION OF OCD SCHOOLS

Mr. THOMAS. Where are your other schools located?

Mr. PITTMAN. There are two more.

Mr. HOLT. There are two in Battle Creek. One is the staff college and the other is the instructor's college at Battle Creek.

Mr. THOMAS. How many schools do you have?

Mr. HOLT. Four.

Mr. THOMAS. Two, Battle Creek, one, Olney, and where else?

Mr. HOLT. On the east coast, in Brooklyn, N.Y., none in Olney.

Mr. THOMAS. And the Pacific coast school?

Mr. HOLT. Is in Alameda.

Mr. THOMAS. How many are there in your seven regional offices? You have 448 in the District of Columbia.

Mr. HOLT. Seventy-three in the training centers.

Mr. THOMAS. There are 73 in 4 training centers?

Mr. HOLT. Yes, sir.

Mr. MANNING. That is three training centers.

Mr. HOLT. Four schools.

REGIONAL EMPLOYMENT

Mr. THOMAS. How many are there in your seven regional offices?

Mr. HOLT. We are planning currently for approximately 600 in our regional offices and 27 in the warning centers. Those are the field warning centers.

Mr. THOMAS. How many of those are there?
Mr. HOLT. Seven, sir.
Mr. THOMAS. How many are there in your secret place?
Mr. HOLT. That includes that figure, sir.

SHELTER, RESEARCH AND DEVELOPMENT AND CONSTRUCTION

Object classification

[In thousands of dollars]

		1961 actual	1962 estimate	1963 estimate
	OFFICE OF CIVIL DEFENSE			
25	Other services			29,855
	Services of other agencies			5,900
26	Supplies and materials			46,000
31	Equipment			2,000
32	Lands and structures			25,000
41	Grants, subsidies, and contributions			425,000
	Total, Office of Civil Defense			533,755
	ALLOCATION ACCOUNTS			
32	Lands and structures			10,000
	Total obligations			543,755
	Obligations are distributed as follows:			
	Office of Civil Defense			533,755
	General Services Administration			10,000

Program and financing

[In thousands of dollars]

	Budget plan (amounts for procurement, research, development, test, and evaluation, construction, actions programed)			Obligations		
	1961 actual	1962 estimate	1963 estimate	1961 actual	1962 estimate	1963 estimate
Program by activities:						
Direct:						
1. Shelter incentives			460,000			435,000
2. Shelter in existing Federal buildings			35,000			35,000
3. Shelter survey, marking, and stockage			56,000			56,000
4. Research and development			17,755			17,755
Total direct			568,755			543,755
Financing:						
Unobligated balance carried forward for completion of prior year budget plans						25,000
New obligational authority (appropriation)			568,755			568,755

NOTE.—Reconciliation of budget plan to obligations:	*1963 estimate*
Total budget plan	568,755
Deduct portion of budget plan to be obligated in subsequent years	25,000
Obligations	543,755

Mr. THOMAS. Let us take a look at your shelter program.
Put page 42 and 43 in the record, Mr. Reporter.
(The pages referred to follow:)

"*CIVIL DEFENSE, DEPARTMENT OF DEFENSE*

"*SHELTER, RESEARCH AND DEVELOPMENT, AND CONSTRUCTION*

"*For expenses, not otherwise provided for, necessary for studies and research to develop measures and plans for civil defense; payment to nonprofit education, health or welfare agencies or institutions toward the cost of shelter construction or modification; providing fallout shelters in existing Government-owned or leased buildings, including existing facilities at military installations, $568,755,000, to remain available until expended: Provided, That such amounts of this appropriation as may be determined by the Secretary of Defense may be transferred to such appropriations of the Department of Defense available for military construction as he may designate. (50 U.S.C., Appendix 2281(d); 31 U.S.C. 712(a); 50 U.S.C. Appendix 2281(h); authorizing legislation to be proposed.)*"

Appropriation summary

The projected program to satisfy the total requirement for 235 million spaces can be outlined as follows:

	1961 actual	1962 estimate	1963 estimate
Shelter incentives			$460,000,000
Shelter in existing Federal buildings		$17,500,000	35,000,000
Shelter survey, marking, and stockage		140,055,470	56,000,000
Research and development		15,484,834	17,755,000
Total		173,040,304	568,755,000

Fiscal year 1962 obligation data is reflected in the President's budget schedules under the appropriation "Civil Defense, Department of Defense", but is shown here for purposes of comparability with the 1963 program. Fiscal year 1961 obligation data is reflected in the President's budget schedules under the Office of Emergency Planning since these civil defense programs were not transferred to Defense until fiscal year 1962.

SHELTER PROGRAM SUMMARY

Mr. THOMAS. We have gone into this in detail. I suggested that the committee might look at it and I am sure whoever is talking will be glad to yield and maybe we can move right along.
Let us put the summary material in the record.
(The pages referred to follow:)

SHELTER PROGRAM GENERAL STATEMENT

At the present time, pending the results of the fiscal year 1962 shelter survey program, the total requirements for fallout shelter space cannot be determined with complete accuracy. Even at this early date, however, it is evident that many additional shelter spaces are required to provide for the known shortages and to allow for distribution inequities. This program is predicated on an estimated need for 220 million fallout shelter spaces today plus a 3 million increase annually for a total of 235 million during the next 5 years. This number reflects the need to provide shelter for persons away from their residence and adds a factor to help in overcoming the distribution problem.

[In millions]

	Estimated number of spaces added annually	Estimated total number of spaces in 5 years
Surveys, 1962	50	50
Surveys, future	5	25
Private initiative	12	60
Incentives program	20	100
Total		235

It is expected that the fiscal year 1962 shelter identification program will provide approximately 50 million shelter spaces. A continuation of this survey work to cover new construction in the future years is estimated to provide an additional 5 million spaces per year. Further, private initiative in constructing home shelters and community shelters in response to Federal leadership, example, information programs and technical assistance is estimated to bring into being approximately 12 million spaces per year.

Allowing for the uncertainty of the estimates, it is evident that more than 100 million additional shelter spaces will be required over the next 4 to 6 years (average, 5 years). Such a schedule further emphasizes the need for full participation of all levels of Government as well as public and private initiative. This requires not only Federal technical assistance and mass information but Federal inducement as well. These inducements have to be adequate to draw forth private and public funds for the broad objectives of the program.

Shelter space could be brought into being by incorporation into new construction only, but this would represent an excessively long term program, extending far beyond 4 years. Modification of existing structures, either by new additions or through alterations is also required if the shelter deficits are to be remedied in a reasonable period of time.

While demonstrating initiative and providing incentive, Federal participation is required to insure a degree of control over the whole program. Such control is needed to assure proper shelter location and capacity, with adequate protection standards, yet reducing waste in the construction program and providing more durable national benefits. It is also necessary that the Federal Government have detailed knowledge of the progress of the programs.

The proposed Federal incentive will take the form of an allowance in terms of the usable square footage of shelter space provided, specifically a maximum of $2.50 per square foot or actual cost, whichever is less, for schools and hospitals and community welfare organizations and institutions. To qualify, all such shelter must be available to the general public, provide at least 500 square feet of shelter area (10 square feet per space), and be approved by the Department of Defense as to need, geographical location, and design specifications.

It is estimated that the incremental cost of shelter space in new construction, accounting for dual-purpose uses, will amount to at least $4 per square foot. Therefore, in new construction it is anticipated that the maximum Federal allowance of $2.50 per square foot will generally be utilized. In modification, however, there will be instances where actual cost of providing space will be less than the maximum Federal incentive. In hospitals and welfare facilities which usually have substantial basements it is estimated that Federal incentives for modification will average $1.75 per square foot. In schools, many of which have been constructed in recent years as one-story buildings without basements, most of the incremental shelter space is expected to be in the form of additions rather than modifications. Such additions will be comparable in costs to new construction. The average Federal incentive for additions or modifications to provide shelter in schools, hospitals, and welfare institutions covered by the program is estimated at $2.25 per square foot or $22.50 per shelter space. This estimate, therefore, is based on $22.50 times 20 million spaces equals

$450 million. This estimate for Federal incentives consists of the following elements:

[In millions]

	New construction		Existing structures		Total		Amount rounded
	Square feet	Amount	Square feet	Amount	Square feet	Amount	
1. Educational	20.0	$50.00	145.0	$326.25	165.0	$376.24	$375
2. Health	3.7	9.25	18.6	32.55	22.3	41.80	40
3. Welfare	4.5	11.25	14.6	25.55	19.1	36.80	35
Total	28.2	70.50	178.2	384.35	206.4	454.85	450

In addition to the new Federal shelter incentive program, the fiscal year 1963 program includes a continuation of the fiscal year 1962 program:

(*a*) Completion of the stocking of shelters identified by the fiscal year 1962 shelter survey, for which funds were not requested in fiscal year 1962.

(*b*) Provision of shelter space in existing nonmilitary Federal buildings.

(*c*) Provision of shelter space in existing military Federal buildings.

(*d*) Continuation of the survey and stocking of newly available shelter space not covered by the fiscal year 1962 survey.

Mr. THOMAS. Look at page 43; the incentive program. This is the first time for this program, is that correct? You did not have it last year?

Mr. PITTMAN. That is a new one.

Mr. THOMAS. Shelter incentives, $460 million; shelters and existing Federal buildings, $17.5 million in 1962 and it goes up to $35 million in 1963; shelter survey, marking and stockage, $140,055,000 this year and $56 million in 1963. That goes down. Research and development, $15,484,000 and that goes up to $17,755,000. That makes the total for this program $568,755,000 against $173,000,000 for 1962.

ADDITIONAL SHELTER SPACES

Look at page 44. This really tells the tale. There are 220 million spaces with a 3 million annual increase for a total of 235 million during the next 5 years. This 5-year table indicates you will have 50 million. You have the same 50 million surveys. You will not add surveys?

Mr. PITTMAN. It estimates that we will add 5 million a year more surveyed spaces, 25 million for the total. In other words, it is 50 million existing spaces, 5 million a year over a 5-year period adds 25 million.

Mr. THOMAS. Private initiative, 12 million, or 60 million; 20 million incentive programs, 100 million. Over the 5 years you have 235 million.

How many square feet are allowed per person?

Allowing for the uncertainty of the estimates—

that is a good statement, and that is the best you can do, we understand—

it is evident that more than 100 million additional shelter spaces will be required over the next 4 to 6 years. Such a schedule further emphasizes the need for full participation of all levels of government, as well as public and private initiative.

It is expected that the fiscal year 1962 shelter identification program will provide approximately 50 million shelter spaces. A continuation of this survey work to cover new construction in the future years is estimated to provide an addi-

tional 5 million spaces per year. Further, private initiative in constructing home shelters and community shelters in response to the Federal leadership, example, information programs and technical assistance is estimated to bring into being approximately 12 million spaces per year.

That is 60 million. That is certainly a big part of your program.

REVISION IN SHELTER SPACE ESTIMATE

Mr. PITTMAN. I wanted to make a minor correction. Our estimate since this was prepared is 4 million new spaces a year from the survey, making 20 million total in 5 years; also in this list the space in Federal and military buildings has not been included. We have estimated that at 3.5. I think in my prepared statement I came up with a total of 233.5. This correlates the two sets of figures.

QUALIFICATIONS FOR INCENTIVE PROGRAM

Mr. THOMAS. You have about 180 or 185 million people in the country as of today. Five years from now the estimate is up to 235 million spaces.

This is where your big money is.

The proposed Federal incentive will take the form of an allowance in terms of the usable square footage of shelter space provided, specifically a maximum of $2.50 per square foot or actual cost, whichever is less, for schools and hospitals and community welfare organizations and institutions. To qualify, all such shelter must be available to the general public, provide at least 500 square feet of shelter area (10 square feet per space), and be approved by the Department of Defense as to need, geographical location, and design specifications.

You allowed the same amount for your modification?

Mr. PITTMAN. Yes.

Mr. THOMAS. But those who are now to participate in the contributions program, they have to be nonprofit institutions, schools, hospitals, churches, and what have you?

Mr. PITTMAN. Churches are not included, although church-affiliated institutions are, if they are engaged in education, welfare, and health activities.

Mr. THOMAS. Why do you exclude churches in the formula?

Mr. PITTMAN. This was a close question and the elements that went into it were these: first we started out attempting to define this in terms of those social benefit type activities which the Federal Government is trying to support; mostly health, education, and welfare activities. It was felt that it would not be sensible to drain the resources of those institutions into shelter construction——

Mr. THOMAS. Page 46 indicates 28.2 million square feet.

Mr. ROMM. That is next year.

Mr. THOMAS. You say for the next 5 years per year.

Mr. ROMM. The new construction element may go up as the knowledge of how to modify new construction designs to include shelters improves. The new construction portion of this may go up and the modification will certainly go down over the next 5 years.

ADMINISTRATIVE SUPPORT FOR INCENTIVES PROGRAM

Mr. THOMAS. What percentage of the $10 million administrative support for incentives programs?

Mr. ROMM. It is a little over 2 percent.

SHELTER INCENTIVES

Mr. THOMAS. Mr. Reporter, include pages 47 through 51 in the record.

(The pages referred to follow:)

Shelter incentives program summary

	1961 actual	1962 estimate	1963 estimate
Educational institutions			$375,000,000
Health institutions			40,000,000
Welfare institutions			35,000,000
Administrative support for incentives program			10,000,000
Total			460,000,000

The Federal shelter incentives program is designed to provide a means of inducing schools, hospitals, and welfare institutions to incorporate fallout shelter protection into their structures, thereby making such protection available to much of our population.

This program is based upon an overall analysis of the need for fallout shelters now being conducted under the shelter survey program. By July 1962, information of the extent of this need in relation to the population in each location will be known in specific terms. Even though the shelter survey program is not completed at this time, it is obvious that the present identification program may provide about one-fourth of the total number of fallout shelter spaces required and these shelters will be better adapted to the daytime population distribution than to the nighttime distribution. The deficit can be made up from a number of sources: group shelters in State and municipal buildings, factories, hospitals, offices, and apartment houses, other large buildings, and family shelters, etc.; community shelters in schools and public welfare institutions. These group or community shelters can be incorporated into new construction or created by modifying existing structures. Development of dual-use space to serve a normal peacetime purpose as well as shelter will be stressed.

Schools, hospitals, and welfare institutions are ideally located for community shelters. Their location generally reflects population density and movement; they are often the most substantial community facilities, and they represent a large share of construction in the United States today. These institutions are organized, with responsible leaders and orderly procedures around which emergency civilian defense actions can be built. However, these nonprofit institutions, public and private, have very limited resources to devote to shelter construction purposes. The Federal shelter incentives program, under the new subsection 201(k) of the Federal Civil Defense Act, is designed to give them financial assistance to permit them to provide public shelter in dual-purpose space.

a. Educational, $376,250,000 (rounded to $375 million)

The provision of shelter in schools, colleges, universities, and educational facilities is given prime emphasis for several reasons. Over one-quarter of the U.S. population attends elementary and high schools and universities. The continued well-being of these students is of extraordinary importance to the future of the Nation. Schools are distributed geographically in relationship to concentration of population. This is particularly true of elementary schools. New and recent school construction reflects the more recent shifts in population. Educational facilities provide the best opportunity for developing shelter space which can serve important peacetime functions of benefit to the Nation. The school building is often the most substantial and best equipped facility in the community. Educational construction continues to be a very active and growing element in the economy. Except for housing, schools are currently the most

prevalent building type in the United States. The school or university is a permanently established organization with responsible leaders and orderly procedures. Consequently, shelters in educational structures provide one of the best opportunities for protection of large numbers of people while serving an important community function.

New construction, $50 million.—It is estimated that in fiscal year 1963 approximately $3.2 billion of new public and private school construction will provide approximately 200 million square feet of floor area (at $16 per square foot without shelter). Of this space, it is estimated that not more than 10 percent of the total school space or 20 million square feet will be applied to combined civil defense and educational purposes, considering geographical location, acceptance by school authorities and the fraction that will be designated as shelter space. Thus, the budget includes $50 million for shelter space in new school construction. Current estimates indicate that the incremental cost for shelter space in schools will be approximately $4 per square foot, the Federal contribution being $2.50 per square foot.

Existing structure, $326,250,000.—On the average there are approximately 2,430 square feet of the whole school space per school classroom and there are 1.2 million classrooms in U.S. schools having more than 1 classroom. Thus there are 2.91 billion square feet of existing school building suitable for shelter consideration. Examination of location, school acceptance, and general desirability leads to an estimate that 5 percent of the total school space or 145 million square feet, could provide dual-use shelter space in fiscal year 1963. It is expected that most of this shelter would prove desirable and acceptable in schools constructed in recent years. Approximately half of the schools currently in use were constructed since 1955. To provide shelter in some cases new additions might be required, in others simple modification would be indicated, which would be subsidized at cost (when less than $2.50 per foot). It is estimated that shelter provision in existing schools would average $2.25 per square foot. The total estimated cost for shelter provision in existing schools is $326.25 million in fiscal year 1963.

b. Health, $41,800,000 (rounded to $40 million)

After schools, hospitals are the most important facility requiring shelter. As in the case of schools, they are generally located geographically relative to centers of population and represent a well organized public service function. They would be particularly important in times of emergency and the shelter provided could serve a valued purpose in peacetime. The total number of hospitals and number of beds have remained relatively constant over the past 10 years. It should be noted that 68 percent of hospital capacity is controlled by Federal, State, and local governments. An additional 29 percent of hospital capacity is in nonprofit institutions.

New construction, $9,250,000.—For fiscal year 1963, it is estimated that 37 million square feet of hospital construction contracts will be awarded. Of this, 10 percent is estimated to meet the shelter criteria and acceptance conditions. At $2.50 per square foot, $9.25 million is the amount estimated for shelter construction in new hospitals for 3.7 million square feet of dual purpose space.

Existing structures, $32,550,000.—Older hospitals are located in builtup areas where there is generally more than enough shelter space in existing structure. Approximately 372 million square feet of hospital space has been constructed since 1950. This is considered to be the space most suitable for shelter conversions and additions. Of this most recently constructed space, 5 percent or 18.6 million square feet is estimated as meeting shelter criteria and acceptance conditions in fiscal year 1963. At an average cost of $1.75 per square foot, the estimate for providing shelter in hospitals by modification from fiscal year 1963 funds is $32.55 million.

c. Welfare, $36,800,000 (rounded to $35 million)

Other welfare activities in addition to educational and health facilities offer similar opportunity to provide community shelter space while also serving a useful peacetime purpose. Community social service activities and public recreational facilities are closely related to population density and reflects population shifts just as do schools. Further, these facilities provide an existing organization capable of providing leadership in event of an emergency.

New construction, $11,250,000.—For fiscal year 1963, it is estimated that 45 million square feet of welfare-type construction contracts will be awarded. Of this, 10 percent or 4.5 million square feet is estimated to be suitable and acceptable

for shelter space. At $2.50 per square foot, $11,25 million is the amount estimated for shelter construction for dual purpose shelter space.

Existing structures, $25,550,000.—Approximately 393 million square feet of community social and public welfare structures have been constructed since 1950. Such structures are considered to be suitable for shelter modifications and additions. It is estimated that 5 percent, or 14.6 million square feet, of this total space would be modified to provide community shelter in fiscal year 1963. At an average cost of $1.75 per square foot, the estimate for providing such selter space amounts to $25.55 million.

d. Administrative support for incentive program, $10 million

To implement the Federal shelter incentive program, administrative support will be required from military, governmental, and nongovernmental facilities. Such support will include military engineers, civilian engineers and architects, administrative support, and computer services. It is estimated that $10 million, approximately 2 percent of the total incentives program, are required for such administrative support.

SHELTERS IN EDUCATIONAL INSTITUTIONS

Mr. THOMAS. Under "New construction, $50 million," you say—

It is estimated that in fiscal year 1963 approximately $3.2 billion of new public and private school construction will provide approximately 200 million square feet of floor area at $16 per square foot without shelter.

Mr. ROMM. This is a projection of current construction that we obtained first from the Census Bureau and the F. W. Dodge Corp. construction statistics and then had it verified independently in the Office of Education.

School construction is a most active portion of the total U.S. construction.

Mr. THOMAS. You think the Federal contribution to modify it will average $2.25. At no time will you allow more than $2.50 per square foot.

Some of your costs are $1.75, $2.25, and so forth.

How much money did you have last year now in your bill?

Mr. ROMM. For this program, sir?

Mr. THOMAS. How much did you have in your last year's bill?

Mr. ROMM. $207 million.

Mr. THOMAS. What did you do with that?

SHELTER SURVEYS AND PROVISIONS

Mr. ROMM. Most of that money is being spent on shelter survey and shelter provisions.

Mr. THOMAS. How much have you spent on shelter surveys and how many square feet are there?

Mr. ROMM. We anticipate 50 million spaces which would be approximately 500 million square feet.

Mr. THOMAS. How many spaces yet to be done?

Mr. ROMM. We expect 50 million spaces to result from the fiscal year 1962 survey and then about 4 million spaces a year from a continuing survey of new construction.

Mr. THOMAS. How much will that cost you?

Mr. ROMM. It is a little less than $2 a space to identify and mark and a little over $2 a space to stock.

Mr. THOMAS. Two dollars to identify. There are how many thousand of them now?

Mr. ROMM. There will be 50 million.

Mr. THOMAS. It will cost how much?

Mr. ROMM. Eighty-one million dollars, originally estimated in the budget.

SELECTION OF ARCHITECT FIRMS FOR SHELTER SURVEY

Mr. THOMAS. You hired about 600 high-grade architect firms. The committee has been told some of these architect firms hired high school boys and girls to go out and earmark and investigate them. Is there any truth in that? How did you pick these 600 firms, and what did you pay them?

Mr. VISHER. The Corps of Engineers made this selection. We set up a standard. Each firm had to have somebody who had gone to this fallout shelter school we established in eight universities, also one at Fort Hueneme, and one at Fort Belvoir. We have sent nearly 2,000 people to these schools and our highest failure rate has resulted since these architects and engineers have sent their people through. They have been sending public officials through, building inspectors——

FALLOUT SHELTER SCHOOLS

Mr. THOMAS. Where are the eight schools located and what courses did they take and how long did they go to school?

Mr. VISHER. It has been a 2-week course. The eight schools have been distributed in each of the regions. I can insert the names of the schools in the record.

Mr. JONAS. Mr. Chairman, before we leave this point let us get these dollar figures in here and answer some of your questions.

After you put the list of schools in the record, show how much you have paid architect and engineer firms to date for the work they have done.

(The information supplied follows:)

Two-week "fallout shelter analysis" courses were conducted during 1961–62 at the following institutions:

University of California, Berkeley, Calif.
University of Colorado, Boulder, Colo.
University of Florida, Gainesville, Fla.
University of Illinois, Urbana, Ill.
University of Michigan, Ann Arbor, Mich.
Oklahoma State University, Stillwater, Okla.
University of Washington, Seattle, Wash.
Worcester Polytechnic Institute, Worcester, Mass.
U.S. Army Engineer School, Fort Belvoir, Va.
U.S. Navy Civil Engineer Corps Officers School, Port Hueneme, Calif.

PAYMENTS TO ARCHITECTURAL AND ENGINEERING FIRMS

Mr. VISHER. We transferred to the Corps of Engineers, or we will transfer before the program is finished, approximately $68 million. The contracts with the architects and engineers for phase 1 will be approximately $27 million. For phase 2, approximately $33 million, which means that we will have paid architects and engineers roughly $60 million for their element of the survey.

Mr. OSTERTAG. Is this out of fiscal year 1962 money?

Mr. VISHER. Yes. There is about $60 million of the money on the survey paid——

Mr. JONAS. You had 600 A. & E. firms and you paid them $60 million?

Mr. VISHER. That is right. The corps will pay out this amount when the program is completed.

SELECTION OF ARCHITECT AND ENGINEERING FIRMS

Mr. JONAS. How were they selected?

Mr. VISHER. By the Corps of Engineers using the procedures that they have established for selecting professional personnel.

Mr. JONAS. I thought the Navy——

Mr. VISHER. The Corps of Engineers and the Bureau of Yards and Docks. The Corps of Engineers and the Bureau have been working together as a team. It has been headed by the Corps of Engineers.

Mr. JONAS. At the end of the fiscal year you will have how many buildings marked?

METHODS OF IDENTIFYING SHELTER SPACES

Mr. VISHER. The method for performing the survey breaks it into two phases. We are analyzing and preparing a description of each building. We will analyze these by computers. We expect to have that computer analysis done by May. This will be sent back to the local civil defense organization. We expect them to know in their area where all the physical space is that meets the protective factor by June. Now, there will be time spent in the local organization obtaining license agreements from the buildings owners and then the marking, the actual large sign marking will take place sometime after that.

Mr. JONAS. For what were they looking in marking these buildings?

Mr. VISHER. The analysis is an analysis for the wall thickness, height of building, length of building, number of basements, number of floors.

I have a typical print-out of the analysis for various buildings here in Washington. On a 10-story building there is much valuable shelter area in the area of 5 to 8 floors. This is printed out. The analysis is done automatically. Each building is analyzed in about one second. This prints out the protective factor in each building and we expect to have this for every building in the country.

Mr. OSTERTAG. By May?

Mr. VISHER. We expect to have the data in our hands by the 1st of May. We expect to have the data fully analyzed—there is about a month turnaround cycle——

Mr. JONAS. Do you mean you build a shelter on the 10th floor of a 20-story building?

Mr. VISHER. The 10th floor of a 20-story building already has certain elements which are very good shelter space.

Mr. PITTMAN. The answer is "Yes," and this is very important to the whole program. We are looking for this mass of material that I described yesterday, between people and the source of the radiation and you find this on the 10th floors of some buildings. You do not have to build anything. If you stay in the center of the building or near the center of the building——

Mr. JONAS. That is protection against fallout only and not against blast?

Mr. PITTMAN. That is correct. There will be some blast protection developed in the survey—the basements of very large, heavily constructed buildings. That will show up in the recorded information.

Mr. VISHER. In the survey we are getting the vulnerability of each building. The Corps of Engineers has some 30 different classifications analyzing different types of framework: Reinforced concrete, solid wall construction, frame building construction. Each of these has different vulnerability characteristics. We are obtaining that information also. We will know the very best physical environment that the country has by the end of May.

BASIS OF COMPENSATION TO A. & E. FIRMS

Mr. JONAS. What was the basis of compensation to the A. & E. firms? So many dollars for marking——

Mr. VISHER. The basis of compensation, we ran 3 test surveys, one at White Plains, one at Baltimore and one in Washington, where very close cost analyses were made on the time it took to perform various elements. This then went into the negotiation. These are all negotiated contracts between the Corps and the architectural engineers. They were largely fixed-price contracts for filling out these forms which have the basic descriptive information.

COMPLAINTS ON SHELTER SURVEY

Mr. JONAS. The chairman said we have had reports of complaints. You were about to answer that question and didn't.

Mr. VISHER. We have checked into several complaints that there was not a sufficient level of competency used in filling the forms out. In running these down it has been determined there has been some studying done by lesser trained people. The actual form filling-out, the measurement of the wall thicknesses, the height of the building, the lengths, these have been done by trained people.

SHELTER SURVEY, MARKING AND STOCKAGE PROGRAM

Mr. THOMAS. Mr Reporter put pages 54 and 55 in the record.

(The pages referred to follow:)

Shelter survey, marking and stockage program summary

	1961 actual	1962 estimate	1963 estimate
Shelter survey, marking and stockage—fiscal year 1962 survey		$140,055,470	$40,000,000
Shelter survey, marking and stockage—fiscal year 1963 new shelters			16,000,000
Total		140,055,470	56,000,000

Stocking fiscal year 1962 survey remainder, $40 million

Remaining from the fiscal year 1962 shelter survey, identification and marking program is the requirement to stock 20 million shelter spaces to be activated in the first half of fiscal year 1963. Further, a total of approximately 350,000 spaces from fiscal year 1962 Federal building construction and modification must be stocked in fiscal year 1963. The cost of stocking with food, water,

medical, and sanitation supplies and radiation measuring instruments is estimated at $2 per space.

Fiscal year 1963 survey and stocking, new shelters, $16 million

The fiscal year 1962 shelter survey and identification program is expected to be substantially completed by June 30, 1962. It is essential to continue this identification of shelter space so as to be in a position to utilize new shelter capacity as it is brought into being exclusive of that provided under the Federal incentives program. Further, these shelter spaces should receive the same consideration as shelter spaces identified and marked in the fiscal year 1962 program, i.e., minimum stocks should be provided for adequate shelter space made available to the general public. Using criteria of the current shelter survey, i.e., need, capacity, public availability and adequate protection, it is estimated that approximately 4 million shelter spaces will be identified and not covered by the incentive program. Such identification and marking is estimated to cost $2 per shelter space and an additional $2 for stocking each space identified. Thus, $16 million is the estimated amount for the fiscal year 1963 survey and stocking of new shelters not provided as a Federal incentive.

FUNDS FOR STOCKING SHELTER

Mr. JONAS. Now, the $140,055,470 you show for 1962—$60 million goes for the payment of A. & E. firms. That would be for survey and marking. Is the balance of that for stocking?

Mr. VISHER. There is $68 million in the total. There is some transfer to the Bureau of the Census for their activity and a transfer to the National Bureau of Standards for their computation. There is some administrative cost to the Corps of Engineers.

Mr. JONAS. Out of the $140 million, how much do you charge to survey and marking and how much to stockage?

Mr. VISHER. For the first 30 million spaces we are charging approximately $74 million for stockage.

Mr. ROMM. In fiscal year 1962 we only budgeted for——

Mr. JONAS. That is all I am talking about now. Your $140 million.

Mr. ROMM. I would like to point out that the survey covers all 50 million spaces but the stockage in fiscal year 1962 was only budgeted for 30 million spaces——

Mr. JONAS. Pardon me. I do not care how many spaces. I am not talking about that right now. I want to know how much of the $140 million is for stocking.

Mr. ROMM. $74 million.

Mr. JONAS. Roughly half of it?

Mr. THOMAS. Two dollars a square foot.

Mr. JONAS. I mean for stocking.

Mr. THOMAS. That was his original estimate.

Mr. ROMM. Something over $2 per person.

Mr. THOMAS. I beg your pardon.

MATERIALS STOCKED IN SHELTERS

Mr. JONAS. Of what does it consist? What is stocked; how many shelters are completely stocked? What do you have in one of these shelters?

Mr. VISHER. We have water containers. It is a fiber drum 16 inches in diameter, 21 inches high, with a plastic polyethylene liner. This drum carries 17.5 gallons of water.

We have a sanitation kit which includes toilet paper, a toilet seat, a privacy screen, toilet chemicals, water ration canteens which is a one-quart canteen. We have waterless soap; water purification pills; sanitary handling gloves and wire ties.

The sanitation kit and the water container are tied together, since you use the water container, after it has been emptied of water as a repository for disposal of human waste.

The food pack includes this dried wheat cracker. We are initially using a flour base cracker. We will then go to a bulgur-based cracker. Bulgur is a parched wheat which has been used for many thousands of years. It has been the primary food resource in the Middle East since before Christ. These crackers are placed in hermetically sealed packaged containers. We have had these packages developed by the Army Quartermaster Corps.

LENGTH OF OCCUPANCY

Mr. JONAS. These are equipped for 2 weeks' occupancy?

Mr. VISHER. One quart of water per day or 14 quarts per person. We have 10,000 calories. Ten thousand calories can be rationed as needed. The very minimal ration for 2 weeks. This primarily is designed for an average 5-day stay time at 2,000 calories.

WASTE DISPOSAL FACILITIES

Mr. JONAS. How have you provided for disposal of human waste?

Mr. VISHER. By the combination of the water container and the sanitation kit. There is one sanitation kit for every 25 people. There is one water container for every 5 people. As the water is used up—you start off with 4 sanitation kits for every hundred people. These are emptied.

Mr. JONAS. Emptied into what?

Mr. VISHER. The sanitation kit contains the toilet paper, the tying strings—things that can be handled. You start off your commode system by using the four empty containers. As they have been filled up—they have been filled up by people after the water has been utilized. When the water is utilized you then have four more water containers available and you take those out of the shelter.

Mr. PITTMAN. You empty it into an empty drum and seal it up.

Mr. JONAS. You remove them from the shelter?

Mr. VISHER. We have the wire ties which I mentioned in the record and you tie up these polyethylene bags. You can leave them in the shelter area. It would be preferable to make short excursions to take them outside.

ITEMS STOCKED IN FALLOUT SHELTERS

Mr. JONAS. You have the things on a list. You can file that for the record.

Mr. VISHER. I will file for the record the items which we are stocking the shelter with.

Mr. JONAS. Segregating them into categories mentioned by the chairman.

Mr. VISHER. That is right.

(The information referred to follows:)

STANDARD SUPPLIES FOR THE FALLOUT SHELTER

GENERAL

The information listed on the following pages is for guidance in handling and placing of shelter provisions and equipment. The further development of packaging and material will cause this paper to be amended as development dictates.

Supplies are planned to attain a shelf life of 5 years. Office of Civil Defense will institute in-storage quality control techniques on a statistical sampling basis to monitor provision and packaging effectiveness. Local government civil defense director should assign responsibility for operational checks of the radiological defense instruments (in the radiological monitoring kit) to a trained radiological defense monitor.

All packages, except the water container fiber drum and the package of polyethylene plastic bags for insertion into the fiber drum, are ready for placement in the shelter and should not be opened. The water container drum and the package of polyethylene plastic water bags are to be opened in or near the shelter for filling. Note that the fiber drum, with its bag liner, is a storage container and not a shipping container.

When stacking supplies in the shelters place the heaviest packages, namely the water containers, on the bottom of the stack with other supplies on top.

SANITATION

1. *Item.*—Sanitation kit.

2. *Number of persons supplied.*—The sanitation kit, with the emptied water containers, together, supply the chemical toilets and sanitary supplies for 20 persons for 14 days of shelter occupancy.

3. *Size and weight.*—The kit is packed in a fiber drum, 16 inches in diameter by 21 inches high and weighs 22 pounds, and is 3.26 cubic feet.

4. *Description of contents.*—Sanitation kit contains:

1 ea. polybag liner
5 pints toilet chemical
1 ea. privacy screen
1 roll twine
6 ea. wire ties, plastic covered 20 rolls toilet paper
1 ea. can opener
6 ea., 50 tablet bottles Globoline water purification tablets
1 ea. toilet seat
1 pr. polyethylene plastic gloves
20 ea. quart polyethylene, screw top water canteens (empty)

Instructions for operation of the sanitation kit are inside the container on the top of the pack. The water container, after the water is consumed is converted to a sanitary commode, as follows:

Slit water bag open at top
Spread mouth of bag over top of water drum
Place toilet chemical, 1 pint, in container
Place toilet seat
When toilet is at capacity close mouth of bag using poly gloves to protect hands, then secure top of bag with wire tie.
Replace drum cover on drum

Note that the sanitation kit package with empty bag supplied also converts to a sanitary commode.

The privacy screen is a sheet of opaque plastic 5 feet by 8 feet, which can be rigged in the shelter utilizing the twine supplied.

The individual one quart canteens allow rationing to each shelter occupant his daily water ration. The water ration is dispensed from the 17.5 gallon water container.

Globoline water purification tablets, military specifications, are included in the sanitation kit. One tablet per quart of water is placed in the canteen before canteen is filled as a precautionary measure. Instructions for use of Globoline water purification tablets are printed on the label on the bottles.

5. *Handling.*—Sanitation kits have no practical limit on stackability (drum nas a 3,000 pound test performance). Kits should be warehoused or placed in shelter so that labels can be read easily.

RADIOLOGICAL MONITORING KIT

1. *Item.*—Radiological monitoring kit.

2. *Persons supplied.*—Radiological monitoring kit I, 50 to 99 person shelter; radioligical monitoring kit II, over 100 person shelter.

3. *Size and weight.*—Radiological monitoring kit I, 14 inches x 10 inches x 10¾ inches, 0.95 cubic feet, 15 pounds; radiological monitoring kit II, 22 inches x 10 inches x 10¾ inches, 1.31 cubic feet, 20 pounds.

4. The radiological kit I contains one instruction manual and necessary batteries in the kit, and 1 CD V 710, 2 CD V 740, 1 CD V 730, 1 CD V 750, 1 CD V 700, 1 CD V 787, all packed in a fiberboard box for storage as a unit.

The radiological detection kit II contains instructions manual plus necessary batteries and 2 CD V 710, 4 CD V 740 or 742, 1 CD V 730, 1 CD V 700, 1 CD V 750, 1 CD V 787, all packed in a fiberboard box for storage as a unit.

5. *Handling.*—The radiological detection kits are fragile; the stackability is not to exceed six boxes, in the warehouse. Do not stack in the shelter since the radiological kit must be accessible for maintenance.

FOOD

1. *Item.*—Food package, biscuit, survival. This is a wheat-flour-based biscuit similar in taste and appearance to a graham cracker.

2. *Persons supplied.*—The food package supplies seven persons with 10,000 calories of food each.

3. *Size and weight.*—Package is 17- by 17½- by 13-inch fiberboard container, 2.27 cubic feet, 47 pounds.

4. *Description.*—Each food package consists of six cans of biscuits packed in a fiberboard container. Each can contains 6 pounds of biscuits (or 390 biscuits) and each 2½- by 2½-inch biscuit contains 30 calories.

5. *Handling.*—The food package may be put in general storage. Care should be taken to stack for readibility of labels. No limitation to stackability for the same items.

MEDICAL

1. *Item.*—Medical kits.

2. *Persons supplied.*—
Medical kit A, 50 persons.
Medical kit B, 100 persons.
Medical kit C, 300 persons (this is a paramedical kit).

3. *Size and weight.*—
Medical kit A, 19- by 15- by 13-inch container, 2.5 cubic feet, 26 pounds.
Medical kit B, 22- by 20- by 16-inch container, 4.3 cubic feet, 49 pounds.
Medical kit C, 27- by 25- by 25-inch container, 9.4 cubic feet, 128 pounds.

4. *Descriptions.*—The medical kits contain the following items:

	Quantity	Kit		
		A	B	C
Medication:				
Aspirin	5 grains—100's	5		
Aluminum hydroxide gelatin dried tablets	5 grains—100's	1	2	6
Ammonia inhalent	1—300—10's	1	2	6
Bismuth subcarbonate tablets	5 grains—100's	1	2	6
Calamine lotion	2 ounces	1	2	6
Cascara sagrada extract tablets	4 grains—100's	1	2	6
Pentobarbital sodium tablets	1½ grains—500's			3
Soap, surgical		2	4	6
Sulfadiazine tablets	7½ grains—1,000's			1
Eugenol	1 ounce	1	1	2
Aspirin	5 grains—1,000's		1	3
Lubricant, surgical jelly	4 ounces	2	4	12
Tetracaine, ointment	5 percent—1 ounce	1	2	6
Penicillin G tablets, U.S.P.	250,000 units			12
Isopropyl alcohol, U.S.P.	1 quart	1	2	6
Chloropromazine hydrochloride tablets	25 milligrams—50's			2
Ear drops		1	2	4
Elixir terpin hydrate	4 ounces	8	16	48
Eye and nose drops	½ ounce	2	4	12
Dressings:				
Bandage, gauze rolls, 2 inches by 16 yards	12's	1	2	6
Bandage, muslin, 37- by 37- by 52-inch triangular.		1	2	6
Cotton, purified	1 ounce	4	8	24
Adhesive plaster, surgical, 3 inches by 5 yards		1	2	6
Pad, gauze, surgical, 4 by 4 inches	200's	1	2	6
Pad, sanitary, heavy	12's	5	8	24
Bandage, absorbent, adhesive, ¾ inch by 3 feet.	100's	1	2	6
Other:				
Applicator, wood, cotton-tipped end	100's	1	2	6
Depressor, tongue, wood	100's	1	2	6
Forceps, splinter, tweezer		1	1	2
Thermometer, human, clinical, oral		2	4	6
Thermometer, human, clinical, rectal		1	2	4
Pin, safety, medium	12's	6	12	36
Syringe, fountain, plastic, and attachments		1	1	1
Scissors, pocket, 4 inches overall		2	4	6
Belts, sanitary		10	20	50
OCD medical self-help manual		1	2	6
HEW-PHS instruction to assure control of augmentation units.				6

5. *Handling.*—The fiberboard containers may be put in general storage. Stack containers so labels are readable. No limitation on stackability on kits of the same type.

WATER CONTAINER

1. *Item.*—Water container.

2. *Number of persons supplied.*—Water container supplies 70 quarts of drinking water (17.5 gallons) adequate for five persons at a rate of 1 quart per person, per day.

3. *Size and weight.*—Water container is a fiber drum with a polyethylene plastic bag liner. The drum, in the form of a cylinder, is 15½ to 16 inches in diameter by approximately 21 inches high. The weight of the drum and liner empty is 4 pounds and weight filled with water is 149 pounds.

4. *Description oand filling operation.*—The fiber drums are shipped as a unit, unstrapped, or otherwise grouped. The polyethylene plastic bag liners (to contain the water inside of the drum) are packed and shipped in a carton containing 200 bags each. The bags in the carton have a single fold without a sharp crease. These bags should be handled carefully to prevent puncture or abrasion between unpacking and the filling operation. Bags should not be doubled folded. Soft iron wire ties for use as a twist-wire closure of the bag spout are supplied within the bag carton.

The following filling instructions are to be found labeled on the face of the drum:

"*To fill*

"Remove drum cover. Insert plastic bag liner and fill with approved tap water by inserting clean hose into bag spout. *Do not fill drum without using plastic bag liner.* Fill to water fill line. Twist spout and double back on itself and tie tightly with wire tie. Replace drum cover."

The following precautions must be observed:

1. The community water supply from which tap water is obtained must be approved by the State or local health department.

2. Filling of containers must be performed in a manner conforming to State and/or local health department regulations.

5. *Handling.*—Empty water containers can be stacked with no practical limit of stackability. Full water drums can be stacked to a practical height of three drums if floor load limits permit. Three full drums imposes a load of 243 pounds per square foot. The date of filling of water drum should be placed on the dateline, on the label.

Mr. VISHER. We do not have any blankets, sheets, or pillowcases. Our elements are a water container, a sanitation kit. We are adding a medical kit and we have the foodpack. These are the four basic elements. As we described yesterday, we are placing in each shelter a radiological kit.

Mr. THOMAS. No sleeping equipment at all?

Mr. VISHER. No sleeping equipment at all.

Mr. THOMAS. No heating equipment?

Mr. VISHER. No heating equipment.

Mr. THOMAS. You do not intend to buy any sheets or anything of that nature?

Mr. VISHER. That is not a part of the Federal stocking program. People will be advised to bring what they can of their own.

VENTILATION OF FALLOUT SHELTERS

Mr. JONAS. How about ventilation?

Mr. VISHER. We have a criteria of 3 cubic feet of air per person in a ventilated area. It is a forced ventilated area. We have a requirement of 500 cubic feet of unventilated area. Five hundred cubic feet provides approximately 18 hours of oxygen supply for individuals. Most basement areas which are unventilated have a certain amount of natural draft and we are investigating——

Mr. JONAS. How are you going to keep fallout from coming through those vents?

Mr. VISHER. The normal ventilation system will take out particle sizes of 50 microns or larger. We have this in the criteria which the Corps of Engineers is analyzing. In some places the filters are placed in the basement areas so in the modification estimate for these buildings which we are surveying we will have to put shielding in to protect and build up fallout in areas which are in close proximity to the shelter area.

AUTHORIZATION FOR SHELTER PROGRAM

Mr. OSTERTAG. How much of this whole program is requiring further authorization and how much does not? There are certain facets of this shelter program that have been in the mill before now; your stockage, for example.

Mr. ROMM. Yes.

Mr. OSTERTAG. Am I right?

Mr. VISHER. There has been stocking items in the matching funds program but not of this character. I think for authorization I would prefer to let Mr. Pittman speak to that.

Mr. MANNING. Mr. Ostertag, the only part of the proposed new program which requires new authorization is the incentives program. We now have the authority to mark and stock the shelters.

ELIGIBILITY FOR SHELTER INCENTIVES PROGRAM

Mr. OSTERTAG. That is what I am getting at.

Then the incentive program, which amounts to $460 million, of which $375 million is for educational institutions; $40 million, health institutions; $35 million, welfare institutions; and then, of course, the administrative support of $10 million.

Now, educational institutions, of course, would be schools, generally speaking; schools and colleges?

Mr. PITTMAN. And nursing schools.

Mr. OSTERTAG. Under the program would that be private schools as well as public schools?

Mr. PITTMAN. Yes.

Mr. OSTERTAG. Is there any line drawn anywhere with regard to eligibility, under your proposal?

Mr. PITTMAN. The only exclusion of schools are schools that are in business for profit. They would have to be public or nonprofit in character.

Mr. OSTERTAG. The health institutions would be hospitals?

Mr. PITTMAN. And clinics.

Mr. JONAS. I have two other questions on stockage when you finish.

Mr. OSTERTAG. In welfare institutions, generally speaking what would be the nature of such institutions?

Mr. MANNING. Shall I read this into the record?

Mr. PITTMAN. Yes. We have a list here which will illustrate it.

Mr. MANNING. The term "welfare activities" in general, sir, will mean activities aimed at helping toward an adjustment of individuals to their social environment or providing custody or care for a group of individuals in order to improve health or general well-being. It includes such types of institutions as vocational rehabilitation facilities, homes for the aged and dependent, settlement houses, homes for the mentally and physically handicapped, including blind and deaf, homes for neglected or dependent children, detention homes and homes for unwed mothers, and other institutions providing care for persons suffering from various types of disabilities in which some general public interest attaches.

It shall also include training schools for juveniles and nursery schools not otherwise eligible under the program.

BASIS FOR PREPARATION OF ESTIMATES

Mr. OSTERTAG. On page 50 you have the estimate listed at $36.8 million, and pointing out that you have rounded it out to $35 million. What is the meaning of that?

Mr. ROMM. All of these estimates are projections into the future. Though our estimates were developed in very careful detail, we did not feel that in coming forward with a request for funds we could justify that degree of accuracy, using projections into the future. Referring to page 46, you will see how we arrived at these estimates and how we rounded them. We rounded in all three categories.

Mr. PITTMAN. It depends on applications. We cannot predict with accuracy what the applications will be.

Mr. OSTERTAG. In your shelter program, which is on a matching basis, or a formula, what is that formula, again, that is proposed in your legislation?

Mr. PITTMAN. The formula is not in the legislation. The legislation relies on regulations which will develop it. Our plan is to offer an incentive of $25 per person sheltered, or the actual cost, whichever is less.

Mr. OSTERTAG. If I recall, Secretary McNamara in his discussing this subject before the Defense Subcommittee referred to $25 out of $40.

Mr. PITTMAN. Yes.

Mr. OSTERTAG. Does that mean $25 of every $40 expended?

Mr. PITTMAN. Our estimate of the average national cost for sheltering people in institutions of this kind is $40.

Mr. OSTERTAG. It would be $25 of the first $40. If they spent more than $40 your ceiling would still be $25?

Mr. PITTMAN. That is right. They would have to put up the additional cost over $25.

Mr. OSTERTAG. Of course, this appropriation has to be predicated to a large extent on whatever the Congress does by way of authorization?

Mr. PITTMAN. That is right.

Mr. OSTERTAG. Is that your estimated expenditure for one year?

Mr. PITTMAN. Yes. This $460 million if for one year.

APPLICATION OF INCENTIVES PROGRAM

Mr. OSTERTAG. When you get into the application and effect of this program, it is going to require a considerable amount of negotiation, application and other factors that will relate to institutions generally and there is going to be a considerable time elapse before much of this could even be on the road by way of physical application. Am I right in that respect?

Mr. PITTMAN. Yes, but I would like to point out that as a result of the survey where architects and engineers will go into many schools and hospitals eligible under the incentive program, we will probably have a package of ready-made applications with the costs all worked out, ready to move so we will have a somewhat faster start than we might otherwise have. But you are in general right.

Mr. OSTERTAG. Perhaps you are ready, but I am speaking in terms of the local application. Hospitals and schools must go through the processes of gaining authority on their own part. I mean authority for funds to match the Federal support. That is not easy and it is not rapid. Am I right?

Mr. PITTMAN. You are quite right.

Mr. OSTERTAG. That is why I am wondering how much of this money could be or would be obligated for expenditure in the next fiscal year.

Mr. PITTMAN. We estimate we will be obligating this amount of money. We are requesting no-year funds. A provision in the amendment of the Federal Civil Defense Act which we are requesting provides that we have authority to continue to use these funds, for a number of reasons including the one you mentioned.

POTENTIAL APPLICANTS FOR INCENTIVE PROGRAM

Mr. ROMM. Mr. Ostertag, would it be useful to you if we could give you the number of potential applicants for this money that exists in the country today?

Mr. OSTERTAG. I think it would, perhaps.

Mr. ROMM. According to the 1961 Statistical Abstract of the United States, there are 50,450 school districts; 92,111 public elementary schools; 25,744 public secondary schools. Now these last two categories exclude one-room schools.

There are 13,170 private elementary schools, 4,026 private secondary schools, 668 publicly controlled colleges and universities and 1,266 privately controlled colleges and universities—most of these nonprofit—and 904 nursing schools. All of these institutions are potential applicants. It is well over 100,000 schools.

Mr. OSTERTAG. I thought you meant to say that already you had received overtures, or more or less preliminary applications.

Mr. PITTMAN. Many institutions have communicated with us an intention to use the program, but it is hard to classify them. Some seem serious and others are hard to judge. We would not venture to predict how many applications are now in the making.

Mr. OSTERTAG. Does this program entail the 50 million markings that you are in the process of formulating?

Mr. PITTMAN. This program is to supplement the 50 million spaces brought in by the survey in better locations——

Mr. OSTERTAG. What is the relationship between this program, this eligibility for Federal assistance for fallout shelters, how is it related to your marking program? Is it a part of it?

Mr. PITTMAN. It is not related as a program, but they have a considerable bearing on each other.

As I pointed out, many of the institutions eligible for the incentive will be picked up in the survey. The result is that the owners of those buildings, these schools and hospitals will know what space they have that is useful and what space they need to round out their needs, or what space is substandard that, with some expenditure of money, could be raised up to the standard.

CRITERIA FOR PROVIDING SHELTER SPACE

Mr. OSTERTAG. In your survey or in your estimate of schools, hospitals, welfare and other institutions, what is the total number of bodies—that is persons—you estimate would be involved in that total survey?

Mr. PITTMAN. We would use the same standard of 10 square feet per person——

Mr. JONAS. No. How many people? When you determine there are a given number of schools, you must know how many students or persons are involved.

Mr. PITTMAN. These institutions will not create shelter space solely for the inmates of the institutions, you might call them, for the students or the hospitalized people. Where there is an opportunity to create a shelter area we anticipate in most instances it will be for the people in those buildings and it will also be a community shelter. The people who live in the neighborhood around will have access to it under a plan developed by the local civil defense organization.

Mr. OSTERTAG. So the actual number of normal persons in such an institution is not taken into account in your estimate of persons to be protected under this?

Mr. PITTMAN. Our plan does not relate to the number of people in these institutions. But the number of people who are a special charge of the society, in these institutions, is, of course, a factor in deciding that these institutions should be eligible for the incentive rather than others.

Mr. OSTERTAG. One more fact comes to my mind: I am reminded of the time I visited the Pine Tree radar line when we discovered that certain of these stations were being manned or operated on an 8-hour-a-day basis. Others were on a 24-hour-a-day basis. But, the point is that the network was only worth what was provided by way of synchronization of the entire network and therefore it was only worth 8 hours a day in the matter of detection.

Now, when we build or provide millions of dollars worth of fallout production for such institutions and schools, schools are only functioning a certain number of hours a day and I do not think that the Soviet Union or any potential enemy who may strike us is going to wait for us to be in school at that particular day or time to be sure we are giving ourselves protection.

Now, the value of these shelters is only going to be to the extent the persons are adjacent or available to such protection. Am I right?

Mr. PITTMAN. Absolutely, and you point up the very reason why we have not attempted to provide protection to particular groups of people and certain institutions. We are trying to create community fallout shelters available night and day to anybody around them, as well as to the people who might be in the buildings at the time. This, of course, imposes a very difficult task of planning on the local civil defense organizations as to how to instruct people and train them to use the shelters—who goes where and under what conditions. Are the families going with the children in school, or do the schoolchildren have a better place to go? It all requires a local solution. We cannot develop a detailed Federal plan to solve these local problems.

SHELTER SURVEY CONTRACTS

Mr. JONAS. 600 A. & E. firms at $60 million would work out about $100,000 on the average. Do you have any firms to whom you pay that much money, or more?

Mr. VISHER. The phase 1 is the one we are getting done by the end of May. I think the figure was about—in that element it was about $27 million versus about $33 million. So on the average we have an average of about $45,000 per A. & E. firm for the work they have been doing to date.

By going back in the building and making this analysis of the amount of cost to improve it, measuring the ventilation, this will be a slightly larger engineering and architectural job and that will take care of the second half.

It is being paid in two elements: (1) the element of gathering the information and putting it on forms; (2) going back and making an accurate——

Mr. JONAS. That first phase measured about $45,000?

Mr. VISHER. Yes.

Mr. JONAS. Looking at your list, did it run up about that much on an average or did you have any that received substantially more than that or substantially less than that?

Mr. VISHER. It is my understanding that there have been several firms that have several offices. There are at least two cases of which I know where the Corps of Engineers has selected a firm having an office both in New York and San Francisco.

Mr. JONAS. What is the largest sum you have paid any one firm?

Mr. VISHER. I haven't that information. I can supply that for the record.

Mr. JONAS. I think it should be in.

Mr. THOMAS. Give us the average figure of what you paid each one of these 600 architects and engineers and then your 10 highest figures and then 2 or 3 of your lowest figures and then your average figure—the amounts you have paid these engineers.

(The information supplied follows:)

NATIONAL SHELTER SURVEY—CONTRACT AMOUNTS FOR PHASE I CONTRACTS NEGOTIATED BY CORPS OF ENGINEERS

1. Amounts of 10 largest contracts: $342,000, $233,000, $220,000, $213,500, $200,000, $141,300, $138,240, $138,000, $128,525, and $132,900.
2. Amounts of three lowest contracts: $1,600, $3,367, and $4,000.
3. Average amount of 584 contracts let: $38,000.

SHELTERS IN EXISTING FEDERAL BUILDINGS

Mr. THOMAS. Mr. Reporter, put pages 52 and 53 in the record.

(The papers referred to follow:)

Shelters in Federal buildings program summary

	1961 actual	1962 estimate	1963 estimate
Shelter in new Federal construction		$7,500,000	
Modification of existing nonmilitary structures		10,000,000	$20,000,000
Modification of existing military structures			15,000,000
Total		17,500,000	35,000,000

Modification of existing nonmilitary structures, $20,000,000

In fiscal year 1962, $10 million is available for provision of shelter space in existing Federal buildings through modification. It is desirable to accelerate this modification so as to provide a Federal example to State and local governments so that they too will provide shelter in existing non-Federal governmental buildings. It is estimated that $20 million for modification of existing Federal buildings will substantially complete the provision of shelter space required in existing Federal structures.

Modification of existing military structures, $15,000,000

Federal Government leadership in the President's civil defense program must include significant example of Federal action to encourage State, local, and public participation. This is particularly essential in the shelter program where we are asking State and local governments to contribute substantially to the creation of shelter space in schools and hospitals. During fiscal year 1962 funds were provided to develop shelter space in existing Federal buildings. This authorization, however, did not provide for the inclusion of shelter space in military buildings and facilities. It would be particularly damaging to the shelter program if DOD, the administering agency, does not recognize the responsibility for the protection of resources under its immediate control. At this time it is estimated that approximately 2.5 million spaces (25 million square feet) will be required on military installations. Applying the criteria of $4 per square feet modification costs are estimated at $100 million. Accordingly, $15 million is requested to initiate this activity in fiscal year 1963.

SHELTERS IN NEW FEDERAL CONSTRUCTION

Mr. THOMAS. This is entitled "Shelter in Federal Buildings."

New Federal construction, $7.5 million in 1962. There is none for 1963. Why is that?

Mr. VISHER. The Bureau of the Budget has requested each agency to place funds in their own construction budgets for incorporation of fallout shelters in new buildings.

Mr. THOMAS. Why $7.5 million last year?

Mr. VISHER. This was a budget item given to us as a part of the $207 million. We have used this money to generate information, to locate shelter space.

Mr. THOMAS. There was a prohibition in the bill last year against the General Services Administration spending any money on fallout shelters, so in the face of that you took $7.5 million of the funds you have and spent it.

What part of that $7.5 million has been allocated?

Mr. VISHER. About $500,000 has been obligated to date.

MODIFICATION OF EXISTING NONMILITARY STRUCTURES

Mr. THOMAS. You have "Modification of existing nonmilitary structures." That is old Federal buildings not used for military purposes, $10 million in 1962. How much of that has been allocated?

Mr. VISHER. None of that has been transferred to the other agencies to date.

Mr. THOMAS. And you have $20 million set up for 1963. Now, what formula are you using?

Mr. VISHER. We are evaluating the building for need and for cost of incorporation. The shelter survey will be one of those elements which has affected our determination on moving rapidly into the modification area.

Mr. THOMAS. Is there any construction money in here, or is that all earmarking money?

Mr. VISHER. This is money for making necessary modifications. Some walls will be added——

Mr. THOMAS. This is construction and marking, then?

Mr. VISHER. This is construction and marking; that is correct

COST OF SHELTERS IN NEW FEDERAL BUILDINGS

Mr. THOMAS. Do you have any idea what this program will cost in 1963 for new Federal buildings? What will it cost for the next 5 years?

Mr. VISHER. We are talking about the new.

Mr. THOMAS. The new construction of Federal buildings?

Mr. VISHER. New nonmilitary.

Mr. THOMAS. That is right.

Mr. PITTMAN. These items are in the budgets of the other agencies.

Mr. THOMAS. Do you have that figure?

Mr. PITTMAN. We do have the figure.

Mr. VISHER. $10.7 million for 1963.

Mr. THOMAS. That includes Post Office, HEW, General Services, and everybody.

SHELTERS IN MILITARY BUILDINGS

Mr. VISHER. The military portion, including the hospitals, the barracks, the administrative buildings, is another item in the military construction program, and I believe that is $5 million for fiscal year 1963.

Mr. THOMAS. $5 million in addition to the $10.7 million?

Mr. VISHER. Yes.

Mr. THOMAS. That is in the military construction bill?

Mr. VISHER. Yes.

SQUARE FOOT COST OF MODIFYING EXISTING NONMILITARY STRUCTURES

Mr. THOMAS. On this item of $20 million this year for modification of existing nonmilitary structures, what do you figure that is going to cost per square foot? Are you using the same formula there that you use for your contributions?

Mr. VISHER. We have gone to an average. There are roughly 500 buildings at the present time. We think the average cost to date on the first group we have analyzed of about 100 is running at $29?

Mr. THOMAS. Per square foot?

Mr. VISHER. Per person.

Mr. THOMAS. How much is that per square foot?

Mr. VISHER. $2.9 per square foot.

Mr. THOMAS. And for non-Federal schools, hospitals, charitable organizations, it is not in excess of $2.50?

Mr. VISHER. We are estimating the incremental cost of incorporating shelter in those will be $4 a square foot.

Mr. THOMAS. But your contribution will not exceed $2.50. And your total cost on this will be all Government expenditures?

Mr. VISHER. These are Government buildings.

Mr. THOMAS. And that is not to exceed $2.90 per square foot?

Mr. VISHER. We are presently looking at buildings on a national average of $40 per person, or $4 per square foot. The group we have been able to look at to date indicates it will run lower than that.

Mr. PITTMAN. We are trying to take the lowest cost opportunities first.

Mr. THOMAS. Your high cost is $4 per square foot. Your average would be around $2.75?

Mr. VISHER. We are looking at buildings as high as $6 a square foot.

Mr. THOMAS. We better stop. You started out at $2.90, you got up to $4.

Mr. PITTMAN. Let's be clear. We are currently proposing to the Bureau of the Budget establishment of a standard which will require a $40 average ceiling applied to each agency.

TOTAL COST OF MODIFYING NONMILITARY BUILDINGS

Mr. THOMAS. What will this total bill cost you over the next 5 years? It is $20 million for 1963, in 1962 it is $10 million. You have not allocated any of your $10 million for last year. You have not spent any of it?

Mr. VISHER. No. We have been in negotiation with GSA.

Mr. THOMAS. What do you think it will cost you to complete this program? I have a figure of $100 mililon.

Mr. VISHER. I think if we went that high, we would be getting into some very expensive space.

Mr. THOMAS. What is your figure?

Mr. VISHER. We will be able to take the cream on the nonmilitary buildings, $20 million proposed for 1963, and I think probably with another $10 to $30 million we will be——

Mr. THOMAS. Sixty-five million?

Mr. VISHER. Of that order.

SHELTER SPACE ON NONMILITARY STRUCTURES

Mr. THOMAS. How many shelter spaces will you get out of it?

Mr. PITTMAN. 3.5 million for Federal and military has been our estimate for the 5 years.

Mr. THOMAS. For this particular program?

Mr. PITTMAN. Yes.

Mr. THOMAS. Of nonmilitary buildings. It will cost you $65 million, you think. How many spaces?

Mr. VISHER. On the order of 2 million spaces for that kind of program.

MODIFICATION OF MILITARY STRUCTURES

Mr. THOMAS. What about your modification of existing military structures? You want $15 million for that. Twenty-five million square feet and an average of $4.

What will this program cost you before you get through?

How many spaces?

Mr. PITTMAN. This part of the program we estimate will continue at about this rate.

Mr. THOMAS. Two hundred fifty thousand spaces?

Mr. VISHER. We expect to have 1.5 million before the program is over.

Mr. ROMM. Two and a half million spaces with a total of 25 million square feet. That is a combination of this program and the new construction program that appears in the Military Construction Appropriation.

Mr. OSTERTAG. Why does this item not properly belong under military construction?

Mr. ROMM. They are modifications.

Mr. OSTERTAG. Modification is construction, is it not?

Mr. PITTMAN. This was a decision of the Bureau of the Budget that the modification part of this was closely allied to the community shelter program. We could move in rapidly now on military schools and hospitals, for example.

Mr. OSTERTAG. But they are military buildings owned by the Federal Government or the Military Establishment?

Mr. PITTMAN. Yes.

Mr. OSTERTAG. Why military construction should not be responsible for this item as against civil defense, I do not understand.

Mr. PITTMAN. The other way of looking at it is that, for this purpose, there is no valid distinction between military and nonmilitary buildings built by the taxpayer.

TOTAL COST OF MODIFICATION OF MILITARY STRUCTURES

Mr. THOMAS. What will this program cost you? $100 million and the other one $65 million?

Mr. ROMM. This will be $75 million.

Mr. THOMAS. Your justification says $100 million; $15 million is requested to initiate this activity for fiscal year 1963.

Mr. ROMM. That $100 million includes new construction.

Mr. PITTMAN. There is a mistake in here.

Mr. THOMAS. You have it here, modification of existing structures, $100 million. Is this wrong?

Mr. PITTMAN. That is wrong. It should be 5 years times $15 million; $75 million.

Mr. THOMAS. Seventy-five million dollars rather than $100 million?

Mr. PITTMAN. That is right.

Mr. THOMAS. For 5 years?

Mr. PITTMAN. Correct.

Mr. THOMAS. Is that clear, gentlemen?

RESEARCH AND DEVELOPMENT

Let's take a look at research. This increases more than $2 million. Shelter research increases from $6.4 million to $6.5 million in 1963. Support systems research remains at $4.5 million.

Systems evaluation increases from $3 million to $3.5 million in 1963. The total increases from $15,484,000 to $17,755,000.

DISTINCTION BETWEEN OEP AND OCD RESPONSIBILITIES

What is the difference in this research program and that of OEP?

You have here shelter research. OEP said they were researching on assets and your research is on people; is that it? I am deciphering my own notes.

Mr. PITTMAN. May we take your first question first? I think Dr. Strope can answer it briefly.

Mr. STROPE. The Department of Defense has the civil defense operating responsibilities. OEP has planning responsibilities for postattack, economic recuperation, and so forth. Basically, their research is in the planning area, ours is in the grassroots of how to get the job done.

Mr. OSTERTAG. Which comes first?

Mr. STROPE. They have to go together, really. The OEP research program is mainly in contact with the postattack research program of this research program. I have looked at both their program and this one.

RESEARCH AND DEVELOPMENT JUSTIFICATION

Mr. THOMAS. We will put pages 56 through 60 in the record.

(The pages referred to follow:)

Research and development program summary

	1961 actual	1962 estimate	1963 estimate
Shelter research		$6,484,834	$6,500,000
Support systems research		4,500,000	4,500,000
Postattack research		1,500,000	3,255,000
Systems evaluation		3,000,000	3,500,000
Total		15,484,834	17,755,000

Shelter research, $6,500,000

This program covers planning, supervision, control, and execution of all research efforts in support of shelter design, construction, and use, including protection studies, environmental studies, subsistence and habitability studies, management studies, component developments, and special shelter projects. It also includes an evaluation and integration of the results into a coherent body of information relating to shelter design, construction, and use. The fiscal year 1962 shelter research items included are primarily applied research items suggested as urgent requirements; $6.5 million will actually be obligated in this area in fiscal year 1962. The budget estimate of $6.5 million maintains this rate. This is a minimum in view of the dimensions of the shelter program anticipated in the next several years.

The pressure of urgently needed applied research and exploratory development evident in fiscal year 1962 will continue to dominate the detailed shelter research tasks in fiscal year 1963. Increased emphasis will be given to protection studies and habitability studies. In the former area, a strong attempt to broaden the present technical base underlying the shelter survey techniques must be emphasized as well as increased study of the protection required by ventilation systems to limit the fallout entrained in intake air. In addition, expanded research on and exploratory development of low-cost means of providing protection to shelter occupants under mass fire conditions will be undertaken. In the latter area, the requirement to assign as many people as possible to the limited shelter space available will force increasing emphasis on the acquisition of knowledge of the limits of crowding in confined spaces. Aside from these areas of especial emphasis, the detailed fiscal year 1963 shelter research program will consist of the continuation of fiscal year 1962 goals.

Support systems research, $4,500,000

This program covers planning, supervising, controlling, and executing all research efforts in support of civil defense operating functions in the preattack, transattack, and immediate postattack period, including warning, communications, command and control, attack assessment, detection and identification of radioactivity and other war agents, evacuation and movement control, damage control and medical aid, and reduction of vulnerability. It also includes evaluation and integration of the results into a coherent body of information relating to the conduct of emergency operations and the reduction of vulnerability to attack. The amount of $4.5 million in contracts and work orders will be obligated in fiscal year 1962. The fiscal year 1963 budget estimate of $4.5 million represents a continuation of this annual rate.

The fiscal year 1962 program is directed toward urgently required tasks in support of current and proposed programs. Many study efforts have been initiated to define the control, communications, and operating requirements implied by the community shelter concept, to summarize the state of the art in these areas as applied to civil defense, and to recommend promising lines of research and exploratory development that may greatly increase operating capabilities or reduce costs of future action programs.

The fiscal year 1963 program will initiate research and exploratory development tasks in areas disclosed by ongoing studies. In addition, increased emphasis will be given to support of fundamental and basic research efforts essential for longer term solutions to emergency operating requirements. The current trend toward development of very large thermonuclear weapons will increase the relative importance of potential fire effects. Research leading to important reductions in fire vulnerability and to capabilities for minimizing and controlling the effects of fire under nuclear attack conditions must also be given research priority if more effective defense against blast and fire is to be considered. Current and future needs for communications and radiological detection are undergoing careful review and should result in redirection of research efforts in these areas. In general, the support systems research program for fiscal year 1963 will continue the fiscal year 1962 goals, with increased emphasis on research leading to better warning capabilities, damage control measures, and reduction of vulnerability.

Postattack research, $3,255,000

This program covers planning, supervising, controlling, and executing all research efforts in support of civil defense operating functions in the postattack period from the point of emergence from shelter to a time after attack when it is possible to effect an orderly transferral of recuperative actions from civil defense responsibility to normal governmental and private agencies, including fallout reclamation techniques, damage repair, reclamation of food and water supplies, control and sustenance of populations, and operational procedures for recovery of specific survival resources and utilities. It also includes evaluation and integration of the results into a coherent body of information relating to the conduct of recuperative operations after nuclear attack. The fiscal year 1962 program for postattack research items is estimated to total $1.5 million in contracts and work orders. This includes research in radiological reclamation and countermeasures, simple decontamination techniques, emergency restoration of critical utilities, debris clearance procedures, recovery operations for critical industries, etc. These studies should be expanded and additional research undertaken in the areas of radiation exposure control, postshelter health problems, and basic studies on fallout characteristics essential to an understanding of decay and weathering effect, ecological significance, and rate of incorporation of radioactivity into the biosphere. The present level of effort is indicative of great pressures for research requirements in the recuperative area. The postattack recuperation problem area is the least understood and, potentially, the most critical of the civil defense problem areas. There is a normal lag in effort between shelter and postattack research. However, it would be an injustice to the entire civil defense effort if this gap becomes too great. The budget estimate of $3.25 million represents an attempt to redress the present imbalance and to achieve substantial progress in fiscal year 1963. Increased emphasis must be placed on understanding the sociological and psychological framework within which recuperative actions must occur, and in defining more adequately the postattack environment within which recuperation must take place.

Systems evaluation, $3,500,000

This program covers planning, supervising, controlling, and executing all research efforts in support of evaluation of alternative defense policies and plans, including threat analyses, general strategic analyses, functional analyses, identification of feasible systems, public attitudes studies, and sociological implications of alternative programs in local, national, and international contexts. It also includes the conduct of weapons effects studies, development of damage assessment methods and techniques, analysis of program requirements, and development of techniques to test and measure effectiveness and readiness of civil defense systems. The fiscal year 1962 program for systems evaluations items totals $3 million in contracts and work orders. The fiscal year 1963 budget of $3.5 million is designed to continue an appropriate level of research in this vital area. Because of the changes in threat level and technology, none of these studies can be considered as lasting solutions that satisfy a given requirement. A continuing effort at a reasonable level is essential if a realistic basis for future policy decisions is to be available.

Increased emphasis will be given in fiscal year 1963 to participation in Department of Defense research efforts directed toward a better understanding of nuclear weapon effects. Civil defense plans and programs must be based on improved knowledge of the blast, thermal, and fallout phenomena associated with high-yield air and surface detonations. In particular, a better definition of the thermal radiation phenomena of very large explosions and a clearer understanding of the factors influencing fire spread in urban and rural areas is urgently needed. Intensified effort should produce data needed for damage assessment, threat analysis, and identification of feasible civil defense systems.

NEED FOR ADDITIONAL RESEARCH

Mr. THOMAS. If we are going to spend this much money on shelter research, it looks like we have the cart before the horse.

Mr. STROPE. Mr. Chairman, I would like to refer to a document produced in 1958 by the National Academy of Science on the adequacy of Government research programs. This study which was done by a large group of people over a considerable period of time came to the conclusion that postponement of basic shelter construction is not warranted in their judgment by any lack of essential technical knowledge. On the other hand, they stated that while——

Mr. THOMAS. You do not need your $6.5 million. When you quote the National Academy of Science, we all lift up our ears. You have plenty but you need more, is that it?

Mr. STROPE. There is a great deal of research that must go on to make these shelters more effective and less costly, and to look into the blast and fire protection problems.

Mr. THOMAS. You have all you need.

Mr. STROPE. That is right.

Mr. JONAS. We do not want to have a modification program as a result of your research. We do not want to spend billions building shelters and have your research determine they were improperly built and have to modify.

Mr. STROPE. The research emphasis in this fiscal year is to give the technical support to the current and the proposed program.

SUPPORT SYSTEMS RESEARCH

Mr. THOMAS. Look at page 58, support systems research, $4.5 million. Again, where is OEP's program any different from this? Give us the details, when, where, and how much, which you do not do in your justifications.

This program covers planning, supervision, and executing all research efforts in support of civil defense operations, and so on.

Damage control, medical aid, and so forth.

Where are you spending this money? Page 58.

Mr. STROPE. It is contract research.

Mr. THOMAS. With whom?

Mr. STROPE. These are with other Federal agencies, universities and private research contracts.

Mr. THOMAS. What are you researching on?

Mr. PITTMAN. Illustrate with a few projects.

Mr. THOMAS. You evidently did not want all this money.

Mr. STROPE. The support systems research program covers the development of radiation detection equipment, and identification of other hazards, problems of command and control.

Mr. THOMAS. If there is going to be research done, someone is going to have to do it. Who is doing it, and what is the subject of the research and what are you paying them?

DETECTION RESEARCH

Mr. STROPE. Let's take detection as a specific example. There are over 200 specific research projects in this year's program.

Mr. THOMAS. What do they average, and who are the researchers?

Mr. STROPE. I can give you some examples and give you the whole thing for the record. Only roughly half of this program is under contract at this moment.

Mr. JONAS. How much is AEC spending on that?

Mr. STROPE. AEC is spending very little on this subject.

Mr. JONAS. Spending very little on detection?

Mr. STROPE. They are a contract of ours. Oak Ridge Laboratory is a contractor in this field.

Excuse me. They are doing research, basic research in detection. They are not in the business of designing——

NATURE OF SUPPORT SYSTEMS RESEARCH

Mr. THOMAS. You had $4.5 million for this support system research last year. How much of it have you spent, and what did you get for your money?

Mr. STROPE. As of the 10th of March we have $1.5 million under contract, $500,000 that the contractor has been selected for and the contract is being prepared, another $1.1 million in bids on which the invitation to bid is out. A total of $3.1 million——

Mr. THOMAS. Who are your contractors, and what subjects are they researching on? Who are your researchers in 1962?

Mr. STROPE. The cost study of automatic monitoring system is being made by the Southwest Industrial Electronics Co. Special purpose Geiger tubes for identification of contamination of water and food are being investigated by Lionel Electric Laboratories, the TV–726 survey meter by Bendex Corp., and the instrument calibrator by Lionel Electronics Laboratory.

Mr. THOMAS. How much?

Mr. STROPE. Funded with prior year money at $49,497. A 10-day water standard is being studied by Tryonix Corp. A review of our whole radiological defense planning process is to be conducted by the Stanford Research Institute.

Mr. THOMAS. How much?

Mr. STROPE. $200,000. We have a major program.

Mr. THOMAS. Put your contractors and the amount and the subject for 1962 and 1963 in the record. And at this point insert the amount of money we have spent for research, say beginning from 1955 through 1963.

(The information supplied follows:)

Fiscal year 1962 research program, Mar. 20, 1962

ACTUAL OBLIGATIONS

Project number	Contract number	Title of project	Contractor	Amount
1101	OCD-OS-62-14	Scale Model Shielding Studies	Technical Operations, Inc	$249,800
1102	CD-GA-56-58	Gamma Ray Penetration Theory.	NBS	48,000
1105	OCD-OS-62-36	Simulated Fallout Ingress Studies.	NRDL	75,000
1106	OCD-OS-62-82	Fire Environment Analysis	Armour Research Foundation	78,290
1107	OCD-OS-62-56	Fire Protection Package Analysis.	do	38,060
1111A	OCD-OS-62-39	Low Cost Protection Against Moderate Blast Overpressures.	Corps of Engineers	50,000
1116		Analysis of Survey Data (Includes 3310, 4104 A and B).	Research Triangle	500,000
1115	OCD-OS-62-145	Initial Radiation Shielding Studies.	AEC	269,000
1201	OCD-OS-62-114	Natural Draft Study	AMF	48,550
1202A	OCD-OS-62-44	Thermal Equilibrium Study	NBS	25,000
1203	OCD-OS-62-116	Simulated Occupancy Experiments.	University of Florida	178,890
1204	OCD-OS-62-51	Humidity Control Study	do	26,870
1205	OCD-OS-62-99	Development of Environmental Test Procedures.	AMF	33,780
1206	OCD-OS-62-48	Heat Transfer in Coarse Filter Beds.	Franklin Institute	49,110
1208	OCD-OS-62-100	Study of Environmental Health Factors.	DHEW	75,000
1209	OCD-OS-62-64	Measurement of Natural Draft.	Pennsylvania State University.	85,000
1301	OCD-OS-62-54	Improved Basic Shelter Foods.	USDA	100,000
1302		Food Adjuncts for Cereal Wafers.		
1305	OCD-OS-62-42	Optimum Water Storage Study.	QM Fd. & Cont. Inst	25,000
1308	OCD-OS-62-49	Optimum Food Service Procedures.	Cornell University	43,870
1309	OCD-OS-62-38	Low Cost Sanitation Systems	Corps of Engineers	100,000
1310	OCD-OS-62-46	Low Cost Sleeping Facilities	QMREC	100,000
1311	OCD-OS-62-80	Low Cost Lighting Systems	Sanders & Thomas	24,820
1315	OCD-OS-62-122	Analysis of Privation Situations.	Bureau of Social Science Research.	28,450
1316		Production Test Bulgur Wheat Wafer.	DSA	125,000
1402	OCD-OS-62-58	Underground Heat Exchanger	Franklin Institute	81,380
1409	OCD-OS-62-66	Materials for Shelter Structures.	Armour Research Foundation	149,670
1410	OCD-OS-62-63	Retractable Periscope Development.	Geometrics, Inc	23,540
1412	OCD-OS-62-37	Nonpowered Sump Pump Development.	Corps of Engineers	25,000
1413	OCD-OS-62-120	Waste Water Recovery Systems.	W. L. Badger Association	21,000
1501	OCD-OS-62-107	Group Activities and Recreational Materials.	AIR	20,040
1502	OCD-OS-62-45	Child Care Studies	DHEW	25,000
1505	OCD-OS-62-123	Shelter Communication Requirements.	Gautney & Jones	48,390
1507	OCD-OS-62-104	Optimum Mgt. & Maint. of Dual-Use Shelters.	AIR	37,390
1508		Manageable Group Sizes in Large Shelters.	AIR	22,189

Fiscal year 1962 research program, Mar. 20, 1962—Continued

Project number	Contract number	Title of project	Contractor	Amount
1604	OCD-OS-62-65	Experimental Construction of Improvised Shelters.	OEP	$13,863
1605	CDM-SR-61-130	Bathroom Shelter Habitability.	Youngstown University	2,400
1607	OCD-OS-62-40	Shelter Design Summary	NRDL	50,000
1608	OCD-OS-62-79	Technical Research Services on Fallout Shelters.	SRI	14,558
1701	OCD-OS-62-52	Explosive Excavation Study	Corps of Engineers	50,000
1702	OCD-OS-62-53	Simple Construction Techniques.	do	50,000
1704	OCD-OS-62-59	Shelter Design Investigations	AMF	45,360
1705	OCD-OS-62-108	Optimum Shelter Configurations.	Guy B. Panero	46,580
2104B	CDM-SR-62-6	Special Purpose Gieger Muller Tubes.	Lionel Electronics Laboratory	7,977
2105	OCD-OS-62-83	Improved Dosimeter Charger	Bendix	32,800
2110B	CDM-SR-61-90	Citizens Survey Meter V-726BX.	do	4,705
2112	OCD-OS-62-50	Test Procedures for Warning Systems.	A. C. Sparkplug Co	22,470
2202		Warning Decision Study	Cornell Aero Laboratory	50,000
2205A	OCD-OS-62-117	Improve Training Effectiveness—Local Level.	AIR	56,170
2205B	OCD-OS-62-121	Improve Training Effectiveness—State and National.	Applied Res. Services	60,54
2206		Analysis of Available Voice Sound Systems.	Bolt, Berenek & Newman	47,500
2210	OCD-OS-62-72	Pyrotechnic Warning System Study.	Rocket Power, Inc	72,220
2212	OCD-OS-62-50	Test Procedures for Warning Systems.	A.C. Sparkplug Co	22,470
2215	OCD-OS-62-78	Analysis of Current Communications Capabilities.	RCA Laboratories	104,640
2404	OCD-OS-62-33	Diagnosis of Communicable Diseases.	DHEW	50,000
2406	OCD-OS-62-32	Care of Infants and Pregnant Women under Emergency Conditions.	DHEW	25,000
2407	OCD-OS-62-129	Simplified Treatment of Burns	DHEW	20,000
2408	OCD-OS-62-130	Delayed Treatment of Wounds.	DHEW	50,000
2409	OCD-OS-62-34	Feasibility Study of Medical Care in Trucks, etc.	DHEW	25,000
2420	OCD-OS-62-35	Rescue Studies	Bureau of Mines	25,000
2423		Infra Red Scanner	Forest Service	10,500
2503	CD-SR-58-45	Committee on Fire Research	NAS/NRC	30,000
2602	OCD-CD-62-89	Fundamental Fire Research	NBS	100,000
2603A	OCD-OS-62-41	Solid State Detectors	U.S. Naval Research Laboratory.	10,000
2603B	OCD-OS-62-70	Solid State Radiation Detectors.	Westinghouse	80,660
3101A	CDM-SR-59-54	Radiological Reclamation and Countermeasures.	NRDL	270,000
3101B	CDM-SR-59-54	Roof Washdown Experiments	NRDL	50,000
3101C		Roof Washdown Studies	NCEL	2,000
3102	OCD-OS-62-43	Primitive Decontamination Techniques.	Chemical Corps, U.S. Army	50,000
3103C	OCD-OS-62-75	Use of Clay Mountains for Emergency Decontamination of Water Supplies.	Corps of Engineers	25,000
3103A	OCD-OS-62-110	Water Decontamination by Ion Exchange.	Vanderbilt University	18,221
3201A	OCD-OS-62-106	Emergency Restoration of Water Supplies.	Engineering Sciences, Inc	95,400
3201B		Cover for Water Supply Reservoirs.	NCDL	3,000
3205		Civil Defense Research Studies at NCEL (Includes 3308B, 3101C, 1403C, 3201B and 3402B).	NCEL	26,000
3304A	OCD-OS-62-68	Psychology of Reconstitution of Society.	Michigan State University	25,250
4101A	OCD-OS-62-131	Fire Spread Model Input Data.	USDA	22,500
4101B		Fire Spread Model Computer Program.	United Research	74,960
4201	OCD-OS-62-109	Crash CD Program Study	Research Triangle Institute	50,250
4204	CDM-SR-59-34	Advisory Committee on Civil Defense.	NAS/NRC	75,000
4205B	CDM-SR-61-124	Shelter Districts—Denver	Colorado Seminary	5,000

Fiscal year 1962 research program, Mar. 20, 1962—Continued

Project number	Contract number	Title of project	Contractor	Amount
4206	OCD-OS-62-60	Development of Techniques for Testing Operation Plans, etc.	Dunlap & Association	$150,000
4207	CD-SR-58-40	Civil Defense Research Project.	University of California	95,000
4209	OCD-OS-62-84	Community Common Facilities Study.	HHFA	10,000
4301	OCD-OS-62-18	Impact of Civil Defense in Foreign Affairs.	Hudson Institute	163,450
4304		BW/CW Threat Analysis	SRI	75,000
4404	OCD-OS-62-31	Protection for Broadcast Stations.	Technical Operations Inc	74,400
4405	OCD-OS-62-77	Protection for Electric Power Systems.	Department of Interior	50,000
4406	OCD-OS-62-61	Protection for Water Systems	G. B. Panero, Inc	44,260
4408	OCD-OS-62-119	Warning Requirements Study	Systems Development Corp	115,490
4503		Fire Potential of Current and Future Weapons.	SRI	100,000
4504	OCD-OS-62-62	Study of Individual Effects of Thermonuclear Attack, etc.	Human Scientific Research Inc.	150,000
4602	OCD-OS-62-71	Long Term Shelter Support Study.	Columbia University	125,000
4603	OCD-OS-62-72	Use of Volunteer Organizations.	Cornell University	52,170
4606B	CDM-SR-62-2	Attitudes—Civil Defense and Shelter.	University of Texas	6,180
4607	OCD-OS-62-19	Communication Process Study.	Michigan State University	71,100
1117		Fallout Shielding Study	DASA $130,000	1,330,000
2604		Fallout Decay Measurements	DASA 200,000	
2605		Thermal Measurements	DASA 25,000	
2119		Fallout Survey Methods	DASA 100,000	
4505		Weapons Test Support	DASA 875,000	
		Total		7,416,133

NOTE.—The above are included in the appropriate program totals.

Planned distribution of unobligated research funds, fiscal year 1962

Shelter research	$1,573,067
Support systems research	3,192,348
Postattack research	935,129
Systems evaluation	1,490,240
Subtotal	7,190,784
Total obligations as of March 16, 1962	7,416,133
Research total	14,606,917

NOTE.—The above does not include $877,917 for prototype shelter construction.

Proposed research projects, fiscal year 1963

Shelter research program:	
Protective studies	$1,500,000
Environmental studies	700,000
Subsistence and habitability studies	1,000,000
Component development	800,000
Shelter management studies	700,000
Systems verification studies	1,000,000
Advanced concepts studies	800,000
Total	6,500,000
Support systems research program:	
Detection and investigation studies	1,000,000
Command control studies	1,000,000
Evacuation and movement control studies	200,000
Damage control and medical aid	1,300,000
Reduction of vulnerability	500,000
Basic research studies	500,000
Total	4,500,000
Postattack research program:	
Fallout reclamation techniques	655,000
Damage repair studies	800,000
Recovery procedures studies	1,000,000
Basic research studies	800,000
Total	3,255,000
Systems evaluation program:	
Damage assessment computation	400,000
Identification of feasible systems	500,000
Systems analysis research	500,000
Program requirements studies	700,000
Weapons effects studies	700,000
Psychological and sociological studies	700,000
Total	3,500,000
Total	17,755,000

Research project obligations, fiscal years 1956–62 (excluding prototype shelter construction)

1955	0	1960	$1,960,438
1956	$1,517,092	1961	2,168,033
1957	2,218,472	1962 (estimated)	14,606,917
1959	3,396,385	1963 (proposed)	17,755,000

The FCDA appropriation for research was not established until 1956. The small amounts utilized prior to 1956 were carried in "Operations, FCDA" and cannot be identified separately.

Data for 1961 and prior years include all research of OCDM and FCDA without separation between resource studies (OEP) and civil defense operations (DOD).

EXPENDITURES FOR RESEARCH

Mr. STROPE. I have the identified research obligations through 1951–61, total $16,868,121. That is a little over what we are spending altogether in fiscal year 1962.

Mr. THOMAS. How much did we spend in 1961?

Mr. STROPE. $2,168,000.

Mr. THOMAS. 1960?

Mr. STROPE. $1,960,000.

Mr. THOMAS. We have been doing a little researching here for 11 or 12 years.

Mr. STROPE. Very little.

Mr. THOMAS. $1 million is quite a bit of researching.

Mr. STROPE. The Department of Defense finds it is necessary for them to spend about 10 to 15 percent of their total budget on R. & D. This problem of civil defense is not any less complex than the development of weapon systems. The average research and development cost on an ICBM is somewhere between $2 and $3 billion.

Mr. THOMAS. That is a good statement to make, but we cannot buy that. I imagine there is a whole lot of difference between the system of an ICBM and a fallout shelter.

Mr. MANNING. May I make a point?

We are going to have difficulty in identifying contractors in the 1963 program because they will not have been selected we can identify——

Mr. THOMAS. You know what you are going to spend and the subjects you want to research on.

Mr. OSTERTAG. These are no-year funds?

Mr. STROPE. The fiscal year 1962 funds are not.

Mr. OSTERTAG. Your contracts spill over into the next fiscal year.

Mr. STROPE. The 1962 research funds are not no-year money.

SYSTEMS EVALUATION

Mr. THOMAS (reading):

The 1963 budget of $3.5 million is designed to continue at an appropriate level of research in this vital area.

What vital area? You cover the waterfront.

Because of the change in the threat level, none of these studies can be considered as lasting solutions that will satisfy a given requirement.

Increased emphasis will be given in 1963 to participation in the Department of Defense research effort directed toward a better understanding of the nuclear weapons effort.

We have a lot of people doing that all over the field. I do not know why you should do that. You are not in the business of developing weapon systems. The Atomic Energy Commission is mixed up in it. The Department of Defense is. NASA is developing certain types of nuclear propulsion units.

Mr. MANNING. Our business is protection from these effects.

Mr. STROPE. We are, as a part of the Department of Defense, an integral part of the R. & D. activity of that Department.

Mr. THOMAS. How are you going to spend this $3.5 million? What are some of the subjects you are going to evaluate?

Mr. STROPE. It will be an extension of this year's program.

Mr. THOMAS. This language is worse than what we call civil service gobbledygook.

Mr. STROPE. $1.3 million is into the weapon test program at a classified level. It will probably be greater this year.

Mr. THOMAS. Why should you be in the weapon systems testing?

Mr. PITTMAN. No one else is looking at it from the standpoint we are concerned with it. I think you are quite right about what happens

when you try to make two paragraphs out of about 6 inches of material. It does not really mean anything. That is what has happened here.

RESEARCH IN WEAPONS EFFECTS

Mr. THOMAS. Where and how are you going to do that research in a weapon system?

Mr. STROPE. Weapon effects.

Mr. THOMAS. Where are you going to do it? Your own laboratories cannot do it.

Mr. STROPE. The weapons effects work consists of experimental work at the Nevada Proving Ground and some essential theoretical analysis of previous data that has not been done.

Mr. THOMAS. How much have you spent on this program heretofore?

Mr. STROPE. $3 million this year.

Mr. THOMAS. You have had no expenditures heretofore?

Mr. STROPE. This was a completely reorganized program.

Mr. THOMAS. How much of the $3.5 million have you spent for 1962?

Mr. STROPE. There is $2.66 million under contract. There are a few thousand dollars in the contract mill.

Mr. THOMAS. Who are you spending this $3.5 million with?

Mr. STROPE. U.S. Department of Agriculture, United Research, Inc.

Mr. THOMAS. How much United Research?

Mr. STROPE. $74,960.

Mr. THOMAS. How much Department of Agriculture?

Mr. STROPE. $22,500.

FIRE-SPREAD STUDIES

Mr. THOMAS. What is the Department of Agriculture doing for you?

Mr. STROPE. The Forest Service is providing input data into a fire-spread model. This is to try to develop a means of determining how fires will spread. This is damage assessment research to support the damage assessment program.

The United Research is building the computer model for analyzing fire spread after attack.

Mr. THOMAS. The Forest Service has had a whole lot of experience. We appropriate around $50 million a year fighting fires in the public domain. I do not know how much research you have to do.

Mr. PITTMAN. Problems of fire following a nuclear attack are different and we want them to address themselves to do that.

Mr. THOMAS. Are they qualified to do that? They are out in the forest.

Mr. STROPE. The Forest Service has done a great deal of research on the nuclear-fire problem.

Mr. THOMAS. In a forest?

Mr. STROPE. No. They have done experiments on large-fire problems around shelters on contract from OCDM at Camp Parks in California. They developed the fire-spread model that is presently being put on the computer at the National Resources Evaluation Center.

VENTILATION OF FALLOUT SHELTERS

Mr. JONAS. I would like to ask Mr. Strope, or the Secretary, to comment on this paragraph which I read from the article prepared by Victor Paschkis, professor of mechanical engineering, and director of Heat and Mass Flow and Analyzer Laboratory, Columbia University.

As long as the shelter is sealed in order to avoid intake of air laden with radioactive particles, the heat generated by its inhabitants will raise the shelter temperature. This temperature rise will reach dangerous levels in a few days depending on the size of the shelter. The curves in chart 3—

and he includes the chart here—

marked "no air intake" hold for this condition, and show that the shelter temperature becomes unbearable after 2 days in large shelters, and after 7 days in small shelters.

Mr. STROPE. The difficulty with that paragraph is that it assumes shelters must be sealed against radioactive fallout. This is not the case. They can be ventilated, and they will be.

Mr. JONAS. Ventilated how?

Mr. STROPE. By ventilation.

Mr. PITTMAN. Either by forced ventilation or by natural draft.

Mr. STROPE. Will you read his first sentence again?

Mr. JONAS (reading):

As long as the shelter is sealed in order to avoid intake of air laden with radioactive particles.

Mr. STROPE. That is not a requirement in fallout shelters.

Mr. JONAS. It is not a requirement in your shelter, but do not more shelters include an outside air vent?

Mr. STROPE. Right.

Mr. JONAS. That would not be sealed, would it?

Mr. STROPE. And he is assuming it will be sealed.

Mr. JONAS. If you do not seal it, if you have an outside vent open to the air, then what happens to the inhabitants if you are within a fire zone?

Mr. STROPE. He is talking about radioactive fallout. You want to transfer this to the fire problem.

AIR FILTERS IN VENTILATION SYSTEMS

Mr. PITTMAN. The question is, What happens if it has an opening; will the dust come in?

Mr. STROPE. The dust will not come in an ordinary ventilation system.

Mr. PITTMAN. The amount of dust that comes in will not be a hazard to the people in the shelter. You may not need a ventilator on it, or a filter.

Mr. STROPE. It is not necessary in most ventilation systems to include a filter.

Mr. JONAS. Will you comment on this paragraph:

One might suggest that the air be filtered to eliminate the radioactive particles, but a filter would increase the power required for the air intake fan. As one cannot count on electricity in the shelter, the fan would have to be hand operated. Hand power may not suffice to draw air through an adequate filter. If air or oxygen can be provided in the shelter, the vent may be kept closed.

Mr. STROPE. The assumed need for a filter is not technically correct.

Mr. THOMAS. May I interupt you there?

I thought they had some generators to supply power and light to keep the filters going and the ventilators going and it was for a dual purpose. Do you not have those generators in each one of your units?

Mr. STROPE. No. The point is, ordinary ventilation systems without filters may be designed to exclude particles above 50 microns. Virtually all the radioactivity in fallout is in particles greater than 50 microns. They just do not come in the system. The fine particles that may come in usually carry very little radioactivity and are not a significant hazard.

This question of requiring filters is one that really aplies to BW/CW problems, and not fallout.

CLOSED-UP CAPABILITY OF SHELTERS

Mr. JONAS. I have one other question I would like for you to comment on from the doctor's paper.

One cannot expect shelters to be provided with bottled air or oxygen to such an extent as to eliminate all need for fresh air.

You would agree with that?

Mr. STROPE. No, sir. I do not agree with that. That is an incorrect statement for some shelters.

The time at which you have to seal the shelter is only for the time and place when the surrounding region is burning. Let me correct that statement—that you may have to seal the shelter, is when it is in a possible fire storm region. The closed-up period would be of about 24 hours duration. We have a shelter in the ground at Camp Parks, a 100-person shelter, which does have bottled oxygen, and baralyme for CO_2 removal with a 24-hour closed-up capability. The cost of this feature is $4 per person sheltered or $4 a shelter space. If this is determined to be a requirement, that is about the cost. It is not a matter of whether it is feasible or not. We have also done experiments.

Mr. THOMAS. Is that $4 per day?

Mr. STROPE. No, sir; $4 per person. For a 24-hour close-up capability to make the shelter independent of the outside air supply.

Mr. THOMAS. Four dollars per day per space. That is what I say.

Mr. JONAS. You have not heard all the quotation yet. We were just talking about bottled air oxygen.

Mr. STROPE. Let me finish, if you will. In a fire experiment with the shelter, we built fuel equivalent to 73 frame residences in a 4-block area around this shelter. This fuel was ignited all at once and achieved a fire storm-like condition for a period of about 8 minutes. Careful measurements were made in the burning buildings, in fuel, in regions adjacent to the fuel, and in the shelter with the vents open. The temperatures in the burning buildings exceeded 2,000 degrees Fahrenheit. Six feet away the temperature was much lower than that. The temperature in the shelter rose six degrees total, and there was no evidence of noxious gasses. However, there are still many questions about fire conditions needing research. We have further studies on these problems in the research program, such as whether we need to seal up the shelters, which shelters we need to seal up, and what the overhead fire conditions may be.

This is why you need the shelter research, to find these things out.

Mr. JONAS. He says further:

Fallout shelter designs always include a vent which must be kept tightly closed during a fire storm.

Mr. STROPE. This is not necessarily true.

Mr. JONAS. Listen to what he says following that. I believe I would prefer to rely on his judgment on this because he scares me in the next sentence:

Otherwise, the fire storm would draw air out of the shelter, asphyxiating its inhabitants. If the wind should drive air into the shelter, it would be air at 2,000 degrees F., which would burn the lungs of occupants immediately.

Mr. STROPE. Those are incorrect statements.

Mr. JONAS (reading):

Electric creation furnaces operate at a temperature of 1,600 F.

You say 2,000-degree heat would not burn the lung?

Mr. STROPE. I did not say that. I said the sentence which says that the wind would blow in 2,000-degree heat is not correct.

Mr. JONAS. That is all.

Mr. THOMAS. Mr. Pittman, we want to thank you and your very able and distinguished staff. You have been more than generous with your time. You have been frank and very helpful. Thank you for coming over.

MONDAY, MARCH 12, 1962.

OFFICE OF EMERGENCY PLANNING

WITNESSES

EDWARD A. McDERMOTT, ACTING DIRECTOR
CHARLES S. BREWTON, ASSISTANT DIRECTOR FOR RESOURCES AND ECONOMIC AFFAIRS
JOHN E. COSGROVE, ASSISTANT DIRECTOR FOR FEDERAL-STATE RELATIONS
IRVIN STEWART, ASSISTANT DIRECTOR FOR TELECOMMUNICATIONS MANAGEMENT (DESIGNEE)
CHARLES H. KENDALL, GENERAL COUNSEL
WILLIAM B. RICE, DIRECTOR OF ADMINISTRATION
RODGER W. WALL, CHIEF, BUDGET BRANCH
CAREY BREWER, DIRECTOR, EMERGENCY PLANS AND READINESS DIVISION
G. LYLE BELSLEY, DIRECTOR, RESOURCES PLANNING AND MOBILIZATION DIVISION
ROBERT W. STOKLEY, CHIEF, REVIEW AND EVALUATION BRANCH
HUBERT R. GALLAGHER, DIRECTOR OF SPECIAL LIAISON
THOMAS W. HAGAN, DIRECTOR OF INFORMATION DIVISION

Mr. THOMAS. Gentlemen, the committee will please come to order.

We have with us this morning our friends from the Office of Emergency Planning. We are certainly delighted and honored to have you distinguished gentlemen before us. There are many new faces, and it is a pleasure to welcome all of you.

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First, we have Mr. Edward A. McDermott, the Acting Director, well and favorably known to the committee. When I run through this list, I want you to introduce all our new folks. I see we have only four old-timers.

Charles S. Brewton, Assistant Director for Resources and Economic Affairs.

John E. Cosgrove, Assistant Director for Federal-State Relations.

Dr. Irvin Stewart, Assistant Director for Telecommunications Management (designee). I see there is an Executive order out this morning on that.

Mr. McDermott. Yes, sir.

Mr. Thomas. Of course, under the existing law, the President acts for the military, and the Federal Communications Commission acts for the civilian agencies. Does this Executive order put the Executive Branch over all of it? I was not quite clear from a reading of it.

Mr. McDermott. On that, Mr. Chairman, Dr. Stewart, who is seated to the far right, is presently the President's designee as Assistant Director.

Mr. Thomas. Let us go into it in a little more detail.

Mr. McDermott. We shall come to that, and I will be glad to have him explain it.

Mr. Thomas. We have Mr. Charles H. Kendall, General Counsel, well and favorably known to the committee.

William B. Rice, Director of Administration.

Rodger W. Wall, Chief, Budget Branch.

Carey Brewer, Director, Emergency Plans and Readiness Division.

G. Lyle Belsley, Director, Resources Planning and Mobilization Division. He has been around a long time, too.

Robert W. Stokley, Chief, Review and Evaluation Branch.

Hubert R. Gallagher, Director of Special Liaison.

Thomas W. Hagan, Director of Information Division.

Have you a statement for us, Mr. McDermott? If you have, we would be glad to listen to you as long as you would like to talk. It might be well first to present your staff to us.

INTRODUCTION OF STAFF

Mr. McDermott. I would be glad to present them to the committee, Mr. Chairman.

Several of the gentlemen with us this morning are, of course, appearing before the Committee for the first time.

Mr. Brewton is the President's nominee and has been confirmed as Assistant Director for Resources and Economic Affairs. Mr. Brewton comes to us from long experience on the Senate side.

Mr. Thomas. Welcome aboard, Mr. Brewton.

Mr. McDermott. To my left, in the middle, is Mr. John Cosgrove, who is Assistant Director for Federal-State Relations, another Presidential appointee. He comes to us from a distinguished record of accomplishment in the educational field with the AFL–CIO.

Mr. Thomas. That is a familiar name here.

Mr. McDermott. These two gentlemen, of course, have been with us since last summer.

Our third Assistant Director is Dr. Irvin Stewart, who sits at my right, who is the President's designee as Assistant Director for Telecommunications Management. We will later in the morning give you further detail on actions which have taken place in connection with telecommunications.

Mr. THOMAS. I hope the doctor will be able to unscramble just what we are doing now and have been doing for the last 5 or 6 years, and what he plans to do. I have read his works, but I would have to go to school a little to understand. Where did you go to school, Doctor?

Mr. STEWART. University of Texas.

Mr. MCDERMOTT. Dr. Stewart should be able to enlighten you in this area, because he comes to us from the University of West Virginia. He was formerly president of that university. He was a former member of the Federal Communications Commission. He was Chairman of President Truman's Communications Policy Board. So he has a very distinguished record.

Mr. THOMAS. When were you over at the Federal Communications Commission?

Mr. STEWART. I was one of the original Roosevelt appointees the first time around at the Commission.

Mr. THOMAS. I thought his face was familiar.

Mr. MCDERMOTT. We feel very fortunate to have his services in this area.

As you have stated, you know Mr. Kendall, who has been with our agency and its predecessor for a number of years.

We have a new member of our staff, Mr. William Rice, who is on my immediate left, our new Director of Administration.

Mr. Heffelfinger, who was the previous Director of Administration, is no longer with us. Mr. Rice has come aboard very recently.

Mr. THOMAS. We are delighted to have you, Mr. Rice.

Mr. MCDERMOTT. Mr. Carey Brewer is Director of the Emergency Plans and Readiness Division.

Mr. Belsley, the committee knows, is our Director of Resources Planning and Mobilization.

Mr. THOMAS. He is an oldtimer.

Mr. MCDERMOTT. Mr. Stokley is Chief of the Review and Evaluation Branch.

Mr. THOMAS. It is good to have you aboard.

Mr. MCDERMOTT. Mr. Hubert Gallagher is our Director of Special Liaison, known to members of this committee.

Mr. THOMAS. He is well and favorably known to the Committee.

Mr. MCDERMOTT. Mr. Thomas Hagan is also new with our agency as Director of the Information Division. He comes to us from the Cox newspaper organization here in Washington.

Mr. THOMAS. He has had a lot of experience.

It is nice to have all of you.

GENERAL STATEMENT

Mr. MCDERMOTT. With your permission and the permission of the members, I have a brief statement.

Mr. Chairman and members of the committee, I appear before you today as Acting Director of the Office of Emergency Planning, re-

cently nominated by the President and at this moment pending confirmation by the Armed Services Committee and the Senate. For the past 10 months, I have served as Deputy Director of this Agency. During that time, the civil defense program responsibilities formerly in the Office of Civil and Defense Mobilization, our predecessor, have been assigned by Executive order to the Department of Defense and the new Office of Emergency Planning has been created to advise and assist the President in determining policy and to assist him in coordinating all nonmilitary defense functions with the total national preparedness program. The Agency has, in addition, numerous responsibilities arising under legislative enactments and Executive orders. Those programs are identified and more particularly described in the detailed submission of our appropriation request.

With this background of recent identification with this agency and its immediate predecessor, and having learned much from a review of the prior hearings of this committee, I appear before you not alone in support of our appropriations request for fiscal year 1963, but also for the guidance and direction that can be forthcoming from your long and intimate understanding of the program responsibilities resting with us.

An area of major concern at the present time, in evaluating our total national preparedness, is the lack of a wholly effective capability at all levels of government to deal with the nonmilitary problems of nuclear conflict. This concern is well stated in the 11th Annual Report of the Joint Committee on Defense Production recently issued. The Joint Committee states:

> Mobilization for general war involving a nuclear attack is so broad in scope that each department and agency of the Federal Government and each State and locality has responsibilities which are so vast as to involve many unanswered questions. The achievement of preparedness for such an emergency will be highly dependent upon the development of mobilization plans followed by such action programs as will provide the means to retaliate against enemy forces, provide warning and protection for the population, and the means for rehabilitation.
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> * * * It is a tremendous task to even identify the various problems in specific terms for this type of total defense effort. The solution to these problems will require increased knowledge and much study and planning. The comparative essentiality of programs and the order of priority involve answers to many difficult questions.

NATIONAL PLAN FOR POSTATTACK REHABILITATION

We view as of primary import the development of plans and the creation of a capability to deal effectively with the vast range of problems of postattack. This is one of our most immediate concerns. In a recent memorandum to the President, the Director of the Bureau of the Budget stated:

> There is an urgent need for the development of a national plan for rehabilitation after a nuclear attack. An adequate plan does not exist at the present time. The Director of the OEP has undertaken the leadership in developing such a plan which will take into account varying assumptions with respect to the nature and duration of the emergency.

Federal plans and policies must be developed to meet the broad spectrum of contingencies of protracted cold war and any further degree of conflict into which it might escalate. These are problems with which each of you is well familiar.

Two immediate actions have been taken. The in-being capabilities of the various departments and agencies of Federal Government have been reviewed and specific emergency planning assignments have been given to several Federal departments.[1] This action we believe will permit achievement of maximum effectiveness and efficiency by building into the ongoing programs of the agencies an emergency preparedness capability. In each of these Executive orders the President provided:

> The Director of the Office of Emergency Planning shall advise and assist the President in determining policy for, and assisting him in coordinating the performance of functions under this order with the total national preparedness program.

EMERGENCY RESOURCE MANAGEMENT

Secondly, in recent weeks we have launched for the first time, a comprehensive program for emergency resource management addressed to the realities of the nuclear age and designed to create an emergency management capability at State and local level. Both of these actions represent a long step in the direction of improved nonmilitary preparedness. All of this, however, constitutes only a beginning.

CONTINUITY OF GOVERNMENT

Equal attention is being given to the problem of effective provision for continuity of government, an area, like resource mobilization and management, which also demands further action. Model legislation has been developed, and has already been adopted to an encouraging degree and we are working closely with the Governors of the 50 States to encourage and assist in the enactment of such additional legislation as may be necessary to insure effective civil direction of government in any emergency that may arise. Decisive support has been given this program by the Council of State Governments and many other national organizations.

New and vital emphasis is being given to already established programs. In addition, our agency is the beneficiary of new assignments closely identified with our responsibilities as adviser and assistant to the President in the administration of the Nation's nonmilitary defense. For example, in December the President directed the initiation of a comprehensive study of petroleum requirements and supplies in relation to national security objectives under the leadership of the Director of OEP. Ths study, requiring substantial staff support, is to be completed by mid-summer 1962. Last month, under Presidential directive, a detailed study of the stockpiling of strategic materials was undertaken to consider the principles and policies which should guide our stockpile program and to make appropriate recommendations to the President. Included in this study is a needed complete review of our supply requirements, both military and civilian, as they relate to national preparedness. A similar review has been commenced on instruction of the President to evaluate the effectiveness of existing

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[1] Executive order assignments have been made to the Departments of Defense, Agriculture, Health, Education, and Welfare, Interior, Commerce, Labor, to the Postmaster General, Interstate Commerce Commission, and the Administrators of the Federal Aviation Agency and the Housing and Home Finance Agency.

plans for the continuity of Federal Government in emergency, including the executive, legislative, and judicial branches, and to recommend such further actions as appear necessary.

DISASTER RELIEF

All disasters, as you know, are not man made. We are striving also to improve the administration of the natural disaster program under Public Law 875. Special procedures inaugurated in connection with Hurricane Carla last fall proved effective in expediting assistance when needed, rendered more effective the operations of all disaster agencies involved, and eased the administrative burdens on the affected States and communities.

Mr. THOMAS. I notice in your justifications there is no request for new funds for disaster relief. This justification apparently was written before the terrible storm we had in the last 5 or 6 days.

Mr. MCDERMOTT. It was, sir. As you know, the justifications were prepared 60 to 90 days ago.

Mr. THOMAS. September or October, I guess.

Mr. MCDERMOTT. They were based on our average annual experience.

Mr. THOMAS. I just point that out to you. You had better get some new figures in here, because you cannot rely upon the Small Business Administration to carry this whole load.

Mr. MCDERMOTT. I have detailed data on that for you, sir.

Mr. THOMAS. Proceed.

Mr. MCDERMOTT. We fully appreciate the sense of urgency that attaches to improving our nonmilitary readiness and the challenge that accompanies that responsibility. We feel that the budget we are discussing today is realistically tailored to carry out these obligations.

SALARIES AND EXPENSES

With substantial planning functions, the major share of our funds will be expended for salaries and expenses. Included in this request of $8 million are salaries and expenses for (1) executive direction, (2) emergency planning, (3) resources and production planning, and (4) research and development. We have reshaped and adjusted our staff requirements to a total of 450 field and headquarters positions in fiscal year 1963. A reduction of 50 positions from present authorized levels is accomplished principally in executive direction and in the proposed elimination of certain specialized positions (that is, women's activities director) in the field.

EMPLOYMENT REQUIREMENTS

Mr. THOMAS. At the proper time, we want you to straighten out the figures. There is a limitation in the 1962 bill of 310 employees in the District of Columbia. Anyway you look at your 1963 justifications, it is around 600, rather than 450.

Mr. MCDERMOTT. Mr. Rice will explain that to you in more detail but, whatever way the figures add up, it is our intention and objective that we will have a total staff, headquarters and field, of 450.

Mr. THOMAS. What people do you have in the field?

Mr. McDermott. We have the eight area offices.

Mr. Thomas. You have the eight regional offices and headquarters in the District of Columbia.

Mr. McDermott. That is correct.

Mr. Thomas. You have the city hall and State employees. Go ahead.

Mr. McDermott. No sir, the matching funds program to pay half the salaries of those employees was transferred to Defense. However, we have people at classified locations.

Mr. Thomas. You do not have very many at your classified location, do you?

Mr. Rice. Twenty-five.

Mr. McDermott. I was referring to the reduction to be in the authorized levels of positions.

This reduction can be accommodated even though some personnel expansion will occur in the office of telecommunications management. By recent Executive order the President has delegated to me, as Director of OEP, virtually all of his telecommunications responsibilities and I have, in turn, made a redelegation to a newly appointed Assistant Director for Telecommunications Management, a distinguished leader in this field who is joining our agency by appointment of the President. Increased responsibilities in this area will, of course, require some additional staff assistance.

Mr. Thomas. What reimbursement, if any, do you have from the Department of Defense or any other Government agency?

Mr. Rice. None.

Mr. McDermott. None to us, sir.

Mr. Thomas. I did not find any in your justifications. Are you sure you do not have any?

Mr. Rice. None to us, sir.

Mr. McDermott. Let me inject this, sir, because it may be pertinent to what you said. We are still in the process of balancing out accounts between us and the Office of Civil Defense as a result of the transfer of facilities and personnel to OCD following Executive Order 10952, but in terms of programs, there is no situation where there would be anything coming back to us.

Every effort is being made to obtain maximum performance and efficiency with minimum personnel requirements. We contemplate staffing our 8 field offices with a total of 90 positions, the minimum required to service the demands of the respective States and coordinate the field activities of other Federal resource departments and agencies in emergency planning, pursuant to the Executive order previously discussed and recently issued.

STATE AND LOCAL POSTATTACK PLANNING

The balance of our request relates to postattack planning, the details of which will be presented to you by the Assistant Director for Resources and Economic Affairs. We request $3 million, to remain available until expended, to develop State and local programs for the most effective use, in time of war, of natural and industrial resources for military and civilian needs, for the maintenance and stabilization of the civilian economy and the adjustment of the economy to war

needs and conditions, postattack recovery and rehabilitation. A nuclear attack upon this country would in all probability temporarily interfere with national economic, mobilization, and management programs. In this critical period action must be taken by State and local governments and these actions must be consistent with Federal plans. We intend, under this program, to enable and assist State and local governments to create that capability and a preparedness to manage their own resources and economies until Federal direction and control can be restored. This is a new concept requiring extensive planning effort, education, and cooperation from all resource agencies of the Federal establishment. This activity has already commenced.

In conclusion, I reemphasize that we deal with problems where not all the answers are known. As the President stated last September, the responsibilities of this Office of Emergency Planning deal with "investigation, advice, coordination, and policy formulation in connection with our preparedness effort. These functions of OEP may be of critical importance to our very survival. The national security requires that there be soundly conceived and well-tested plans for every emergency."

I can only assure you of my intention to devote my full energies and capability to attaining maximum efficiency in the performance of our responsibility and of my desire, as stated earlier, to have the benefit of your collective counsel and advise.

I wish also to express my appreciation to this committee for its demonstrated interest in and concern for matters affecting the security and well-being of our country. The opportunity to work with you is a welcome one.

I believe that with the funds requested and with the support of the Congress and the private sector of our national economy, we can do the job that has to be done.

Mr. THOMAS. That is an excellent statement, Mr. Director.

NEW FUNCTIONS AND ACTIVITIES

About 6 weeks ago the committee wrote your predecessor and asked him to submit to the committee, at his pleasure, a statement setting out new functions and new activities which would be included in the 1963 budget which were not included in the 1962 budget. There is one, at a cost of a million and a half dollars. If I understood your statement a while ago, you used the figure $3 million for the same activity. That being true, since there is only one new activity, which is spelled out, what are you doing now that you have not been doing for the last 11 years? This organization came into existence in June of 1950. It has been 12 years, has it not?

Mr. MCDERMOTT. Essentially, sir, what you are referring to is the difference, I suppose, between the present responsibilities of the Office of Emergency Planning and the predecessor organization most closely identified with what we are now, the Office of Defense Mobilization, ODM. During the last fiscal year, as you know, the civil defense program responsibilities, which were formerly with FCDA and went to OCDM when the two organizations were merged, have been reassigned and transferred out of our agency and to the Office of Civil Defense.

Mr. THOMAS. We are familiar with all that.

Mr. McDermott. The ODM functions were in the field of resource planning and mobilization. It had a certain telecommunications responsibility. It had a certain Federal continuity of Government responsibility. It had a responsibility for wartime organization planning and emergency censorship. It had some stockpiling responsibility. It had an assignment under section 8 of the Trade Agreements Extension Act.

Mr. Thomas. We are familiar with all that. What are you doing now that you have not been doing for the last 12 years in the same field?

Mr. McDermott. Under Executive Order 10952, which was issued last summer, the President has issued this directive to the Office of Emergency Planning: that it shall advise and assist the President in respect to determining policy and coordinating the nonmilitary defense program of the Government, in determining appropriate roles of the Federal departments and agencies, and in providing assistance to the States——

Mr. Thomas. There is nothing new about that. You have been doing that for 12 years.

Mr. McDermott. We did it for several years, but as part of the FCDA agency responsibility.

Mr. Thomas. What is left of the two predecessor organizations and what you have today. I repeat my question for the third time: What are you doing now that you have not been doing for the last 12 years?

Mr. McDermott. What we are doing now is attempting to respond to the sense of urgency and increased emphasis that the President has attached to improve our total nonmilitary preparedness. It involves substantial activity with the States and local communities in developing a resource management capability.

Mr. Thomas. You have been doing that.

Mr. Ostertag. You did not do that before?

Mr. McDermott. Sir, not with the States, no. I am informed that there was little or no activity with the States, because the nature of the threat has changed.

Mr. Thomas. You have had 3,600 to 3,800 employees. You have not had that whole 3,800 for 12 years, but you have had them for at least 3 years. You have had 2,500 of that 3,800 for many, many years.

Mr. McDermott. FCDA and OCDM had about 1,700 and State and local agencies in excess of 2,500.

Mr. Thomas. They were doing just exactly what you are doing now. If they were not, what were they doing? How can you justify their existence in the past?

Mr. McDermott. That would be difficult for me to do, sir, not having been here at that time.

Mr. Thomas. How long have you been with the organization?

Mr. McDermott. I have been with them 10 months, sir.

Mr. Thomas. You learn fast. In 10 months you have done a beautiful job.

Mr. McDermott. I have difficulty finding out, sir, all that was done in the preceding 10 years. You are very much better informed on that than I am. The fact is, in the activities in OCDM there was clearly a civil defense orientation as a result of the merger of ODM and FCDA. The ODM functions did not receive, in my opinion, the

same priority attention that was accorded the civil defense function. If there was a responsibility in these areas in OCDM, as there clearly was, it is our position, and it is my view on the basis of what I have learned, that those assignments were not accorded the attention that they deserved.

STOCKPILING ACTIVITIES

Mr. THOMAS. Let us take a look at your stockpiling activities. What are you doing about that now? This committee has been urging your predecessors for 5 or 6 years to get rid of at least 40 to 50 percent of that stockpile. In order to help you do that, we certainly have suggested to you, by way of not supplying any funds, that you not buy very much new and additional material. Of course, you have acquired a lot of it in the last 4 or 5 years through your Public Law 480 program, for which you are not responsible, of course. But you are responsible for the merchandise after you get it, and it goes into the critical stockpile. What are your plans now, if any? What do you plan to do about it, other than what you have been doing for the last 5 or 6 years?

Mr. MCDERMOTT. First of all, Mr. Chairman, as you know from recent stories in the press, this is a subject which is also of concern to the President. He announced about 5 weeks ago that he felt that changes had to be made in the policies relating to the stockpile, and that surpluses in the stockpile should be disposed of if a disposal plan could be developed. He was most interested in removing the cloak of secrecy that had been attached to the information relating to the stockpile.

DECLASSIFICATION AND DISPOSAL OF MATERIALS

In furtherance of that objective, about 3½ weeks ago he appointed a committee. The committee is comprised of myself as chairman, and the members of the committee include the Secretary of Defense, the Secretary of State, the Director of CIA, the Secretary of Commerce, the Secretary of the Interior, the Secretary of Labor, and the Administrator of the General Services Administration. That committee, supported by its staff, has been meeting regularly and frequently. We propose to have a report for submission to the President by March 19, which is the date indicated in his memorandum to me. We have not finally determined what the recommendations of this committee will be to the President, but all of these matters are receiving attention, and we hope, first, to be able to accommodate his objective that a lot of information now classified with reference to the stockpile may be declassified; and, secondly, to be able to propose to the President a reasonable disposal program which will permit us to get rid of some of the identified surplus in the stockpile.

VALUE OF STOCKPILE

Mr. THOMAS. What is the dollar value of the stockpile as of, say, March 1, plus the Public Law 480 stockpile?

Mr. MCDERMOTT. It is approximately $8 billion. Mr. Belsley, could you give the exact figure on that for the chairman?

Mr. THOMAS. The most recent figure that you have, please.

Mr. BELSLEY. This is the market value, Mr. Chairman.

Mr. THOMAS. We want two figures, the acquisition cost and the present market value.

NATIONAL STOCKPILE

Mr. BELSLEY. The total acquisition cost materials in the national stockpile was a little over $6 billion.

Mr. THOMAS. What date is that?

Mr. BELSLEY. These figures are as of September 30, 1961.

Mr. THOMAS. That is 6 months ago. Have you not any more recent figure?

Mr. BELSLEY. The acquisition cost remains about the same.

(Off the record.)

Mr. THOMAS. What is the present market value of the national stockpile?

Mr. BELSLEY. The present market value of the national stockpile was a little over $5.7 billion, almost $6 billion.

Mr. THOMAS. What about the Public Law 480 stockpile?

DEFENSE PRODUCTION ACT STOCKPILE

Mr. BELSLEY. Shall I give you the Defense Production Act inventory, too?

Mr. THOMAS. Please.

Mr. BELSLEY. The acquisition cost of the Defense Production Act inventory was $1,485 million, almost $1½ billion, with a market value of around $938 million.

Mr. THOMAS. So you have $6 billion plus $1.8 billion.

SUPPLEMENTAL STOCKPILE

Mr. BELSLEY. With respect to the CCC barter, the acquisition cost was $101 million and the market value was in the neighborhood of $102 million. The supplemental stockpile is made up of the CCC acquisitions that are transferred to the supplemental stockpile. It is treated similarly to the national stockpile as far as disposals are concerned.

Mr. THOMAS. The $1.8 billion is the DPA stockpile?

Mr. BELSLEY. The $1.5 billion acquisition cost is the DPA inventory.

Mr. THOMAS. All right, what is the Public Law 480 program?

Mr. BELSLEY. $994 million acquisition cost for the supplemental stockpile. Then there is a small one which was the old RFC.

TOTAL COST AND MARKET VALUE

Mr. THOMAS. It totals close to $8¾ billion.

Mr. BELSLEY. That is about correct. Almost $9 billion acquisition cost, and a little over $8 billion market value, as of September 30, 1961.

Mr. THOMAS. It appears that we should get rid of at least 50 percent of that. We would have plenty left, would we not?

Mr. MCDERMOTT. Based on current objectives, there is a very substantial excess.

NUMBER OF ITEMS IN STOCKPILES

Mr. THOMAS. How many items in the stockpile? Eighty-four?

Mr. MCDERMOTT. Seventy-six.

Mr. BELSLEY. Seventy-six major ones, with current objectives.

Mr. THOMAS. You say "major." The sum total of the items is about 84.

Mr. BELSLEY. The 76 with current objectives, plus an additional 20-some items without objectives.

ITEMS WITH INVENTORIES IN EXCESS OF OBJECTIVES

Mr. THOMAS. Of the 76 major ones, how many are in excess of any criteria of need that you have developed heretofore, on a 5-year program, a 4-year program, or a 2-year program?

Mr. BELSLEY. Of the 76, all but 10 have reached or exceeded the current maximum objectives which have been set on the basis of a 3-year emergency.

Mr. THOMAS. What part of the 76 are far in excess of your criteria or your needs, to the extent of 100 percent or more?

Give a "horseback" opinion of that, and then straighten it out for the record.

(Discussion held off the record.)

Mr. BELSLEY. You are interested in all inventories?

Mr. THOMAS. Yes. You said all but 10 of the major 76 items have reached their maximum requirements. Then I asked what part of the 66 remaining had exceeded by 100 percent your original criteria based on any yardstick you are now using, a 5-year war, a 3-year war, or a 2-month war.

Off the record.

(Discussion held off the record.)

Mr. THOMAS. Would it be at least 50 of the 66 items?

Mr. BELSLEY. About 66 either have reached or are over the objective.

Mr. THOMAS. No——

Mr. BELSLEY. In excess of the 100 percent?

Mr. THOMAS. Yes, would it be 50 of the 66, 40 of the 66?

Mr. BELSLEY. No, sir, not that many.

Mr. THOMAS. Give us a "horseback" opinion and you can straighten it out later.

Mr. BELSLEY. About 26.

STATUS OF STOCKPILE INVENTORIES

Mr. THOMAS. Would you be good enough at this point in the record to set out the acquisition costs and market value, as of December 31, 1961, of this year, for the three big problems, and also the two small ones?

Mr. BELSLEY. The total?

Mr. THOMAS. Yes, by programs.

Mr. BELSLEY. Very well, sir.

(The information supplied follows:)

Summary of raw materials inventories on hand and on order, by programs, as of Dec. 31, 1961

[Total stockpile objectives, $4,368,159,700 (market value as of Dec. 31, 1961)]

Description	Acquisition cost	Market value
I. Total inventories:		
National stockpile	$6,088,152,400	$5,729,553,200
Defense Production Act	1,478,766,800	920,768,200
CCC barter	103,822,200	107,759,100
Supplemental stockpile	1,037,931,300	961,920,900
RFC	2,906,500	3,228,300
Total on hand	8,711,579,200	7,723,229,700
On order	246,929,800	248,280,700
Total inventories on hand and on order	8,958,509,000	7,971,510,400
II. Inventories within objectives:		
National stockpile	3,860,771,400	3,964,844,300
Defense Production Act	240,151,700	156,221,800
CCC barter	54,705,800	59,386,400
Supplemental stockpile	154,470,200	151,911,200
RFC	0	0
Total on hand	4,310,099,100	4,332,363,700
On order	9,259,600	9,647,100
Total within objectives	4,319,358,700	4,342,010,800
III. Inventories excess to objectives:		
National stockpile	2,227,381,000	1,764,708,900
Defense Production Act	1,238,615,100	764,546,400
CCC barter	49,116,400	48,372,700
Supplemental stockpile	883,461,100	810,009,700
RFC	2,906,500	3,228,300
Total on hand	4,401,480,100	3,390,866,000
On order	237,670,200	238,633,600
Total excess	4,639,150,300	3,629,499,600

STOCKPILE DISPOSALS

Mr. JONAS. Would it not be advisable to have included in that table, also, what amounts have been disposed?

Mr. THOMAS. The rotation, yes.

Mr. JONAS. For the last 3 or 4 years.

Mr. BELSLEY. Very well, sir.

Mr. JONAS. How much was disposed of in 1961? How much was sold?

Mr. OSTERTAG. What was acquired?

Mr. BELSLEY. Relatively little acquired, about $75 million sales commitments were actually made in 1961. The estimated market value of strategic stockpile and DPA materials currently authorized by OEP for disposal but not yet sold as of December 31, 1961, amounts to about a half billion dollars. This is authorized by OEP but not actually disposed.

Mr. THOMAS. You will have to break it down among the three programs.

Mr. BELSLEY. About $487 million is accredited to the national stockpiles and the remainder to the DPA inventory and the supplemental stockpile.

Mr. JONAS. Have you the 1960 figures?

Mr. BELSLEY. There are pending in the Congress a number of disposal plans in the estimated amount of about $222 million worth of materials which must have the approval of the Congress. Most of these have been pending, since 1961; one of them has been pending since 1957.

Mr. THOMAS. That is out of the critical stockpile itself?

Mr. BELSLEY. Out of the national stockpile.

Mr. JONAS. If you may add something else to the record:

When you prepare this material for the record, would you show how long requests have been pending before Congress to dispose of these materials and actions taken by Congress on those requests?

Mr. BELSLEY. Yes, sir.

(The information requested follows:

Disposal plans approved by Congress

Material	Unit	Quantity	Published in Federal Register	Approved by Congress
Diamonds	KT	55,465	Aug. 5, 1958	Sept. 9, 1959
Nickel-cobalt-copper calcines	ST	3,431	Jan. 25, 1961	Mar. 29, 1961
Nickel matte	ST	87	do	Do.
Osmium	TrOz	27	Aug. 15, 1958	Sept. 9, 1959
Rhodium	TrOz	2,515	do	Do.
Ruthenium	TrOz	51	do	Do.
Rubber	LT	470,000	Sept. 15, 1959	May 4, 1960
Zirconium ores, zircon	SDT	15,902	Mar. 13, 1959	Sept. 9, 1959

Disposal plans awaiting congressional approval as of Dec. 31, 1961

Material	Unit	Quantity	Published in Federal Register
Brass scrap	ST	520	July 19, 1961
Bronze, silicon, and copper scrap	ST	74	Do.
Castor oil	Lb	155,676,000	Sept. 13, 1961
Celestite	SDT	28,816	Mar. 16, 1961
Chromite, metal	LT	1,890	Oct. 18, 1961
Cobalt carbonate	Lb	5,500	Sept. 26, 1961
Cobalt oxide	Lb	265,000	Do.
Copper, beryllium scrap	ST	11	July 19, 1961
Cordage fibers:			
(a) Abaca	Lb	7,500,000	Jan. 26, 1961
(b) Sisal	Lb	10,000,000	Do.
Cotton (extra long staple)	BL	220,000	Aug. 30, 1957
Ferromanganese and manganese metal	ST	67	Dec. 5, 1961
Ferrovanadium	Lb	65,447	Oct. 31, 1961
Nickel ingots, sintered powder, cobalt rondelles	ST	109	Jan. 25, 1961
Platinum scrap	TrOz	4,471	July 19, 1961
Silk noils	Lb	1,450,000	Aug. 24, 1960
Tin	LT	50,000	Sept. 7, 1961
Vegetable tannins	LT	3,400	Mar. 15, 1961
Zinc foil	ST	106	July 19, 1961

DISPOSAL POLICY

Mr. EVINS. Would it be fair to say, Mr. McDermott, that the emphasis of your predecessor agency was on the building up of the stockpile, and perhaps the major activities in connection with the stockpile program were involved there, and now there has been a division of function through Executive order, and you are concerned not primarily with the stockpile but with advising the President on postwar

planning and assistance to States. Is that your major emphasis?

Mr. McDermott. We have a responsibility with reference to the stockpile at the moment in endeavoring to advise and counsel with the President on what can be done about the situation which exists today, and that is the reason this Committee to which I referred earlier was appointed.

CONGRESSIONAL APPROVAL REQUIRED FOR DISPOSAL

Mr. Evins. We have been told earlier there can be no disposition of the stockpile without an act of Congress.

Mr. McDermott. That is generally true with respect to the national and supplemental stockpiles. A large share of the stockpile cannot be disposed of unless that is done, under today's situation.

There is so much surplus in the stockpile that there is a danger of throwing domestic interests into difficult problems, and also there are international implications of making substantial dispositions from the stockpile of those materials which represent a principal product of a particular foreign source.

In the study we are making at this time we have those considerations in mind as well as our basic objective of reducing some of this excess to the maximum extent possible.

Mr. Evins. I take it you have made your recommendations for legislation to the Congress?

Mr. McDermott. Part of the work of this committee, which we hope to conclude by next Monday, is addressed to that point and there will be legislative recommendations.

Mr. Evins. What are your plans with respect to advising the States and communities? The States have been tied up in civil defense planning. There have been tremendous grants of funds for emergency hospital supplies, and so on.

What are your plans for assistance to States and communities in the future?

STATE AND LOCAL POSTATTACK PLANS

Mr. McDermott. In terms of our program responsibility, which is in the resource mobilization and management area and the postattack recovery and rehabilitation area we have inaugurated a comprehensive program of resource management which we are taking to each of the Governors. We are holding a series of area conferences on this subject and we are endeavoring to interest and educate and inform governmental and nongovernmental leadership in the respective States of the nature of the problem which they may face in a nuclear postattack period, and encouraging them to develop a capability at State level to manage their resources and to manage their economy if there should be a disruption in the traditional Federal direction and management of those programs which we enjoy in peacetime.

Mr. Cosgrove, the assistant director in charge of that program, can speak briefly to how that is being approached and what the response of the States has been to date.

PLANS FOR CONTINUITY OF GOVERNMENT AND RESOURCES MANAGEMENT

Mr. COSGROVE. Mr. Chairman, we have a plan of carrying forward the comprehensive programs, this combination of the dual programs of continuity of Government and resources management. These are geared to State and possibly local capabilities. This has been initiated since the first of the year in terms of presentation to the States.

We have gone about it in this fashion: We have asked the area office directors to visit with Governors of each State or with top executives in the States, and explain to them our comprehensive program.

I am happy to report to you that of the 53 jurisdictions, 50 States and 3 territories, we have now completed briefings in about 48 of them.

Without any exception the Governors or the top State executives have reacted very affirmatively to this program.

We explained to them that our purpose is really twofold—one, to involve more heavily in the operation of the State governments and the local governmental authorities in emergency planning, preparing for resource management and Government continuity. Second, it is to involve more heavily the private sector of the economy, leaders of business, industry, labor, and agriculture, at both local and the State levels, and bring them into coordination with this program. This is something new, I believe.

Mr. THOMAS. You have had that program for 6 or 7 years; have you not?

Mr. COSGROVE. Not in the form of an established mechanism which we can rely on for resource management.

Mr. THOMAS. What have you been doing with all of that personnel for the past 6 or 7 years, then? What have they been doing?

Mr. COSGROVE. Again I am under the same handicap as the Director. I was appointed by the President only last August. Certainly you are correct in saying relations were maintained with the States and local governments by OCDM.

I think the new aspect here is on the importance of the total government structure at every level on one hand and the importance of involving the private sector of the economy on the other.

Mr. EVINS. Could it be said, in jest, that perhaps the chairman is trying to find out what you are doing? You may be doing the same things that your predecessor did but you may be doing it better.

ESTABLISHMENT OF STATE EMERGENCY RESOURCES PLANNING COMMITTEES

Mr. JONAS. Right at this point I would like to have a little more definitive information. You do a lot of talking about resource management. Tell us in practical terms what you have advised the Governors to do in these conferences you have already held.

Mr. COSGROVE. I will tell you exactly what we have asked of them because it is a very helpful question. The Area Director of the Office of Emergency Planning explains to the Governor the program booklet with which you are acquainted. He presents them with a résumé letter from the Director and asks him to do three specific things.

First, he is asked to designate an Emergency Planning Director for the State.

Second, he is asked if he will name to advise him an Emergency Resources Planning Committee.

Third, he is asked to participate in an area emergency planning conference. The Director referred to this briefly.

In this emergency planning conference, which is really the second phase after the briefings to the Governors, we bring in the people from the agricultural organizations, labor, industry, finance, transport, fuel, and so on, and present them——

Mr. THOMAS. If you look through the justifications, you have been doing that for 5 or 6 years.

Mr. COSGROVE. Mr. Chairman, there certainly have been programs of an area conference nature in economic stabilization, manpower, and two or three subject areas such as this.

We believe we have here a total program which can be developed which has not been presented before. We think fragments have been presented.

We think this new emphasis and the pulling of it together in a coordinated place is new.

We think greater reliance on people from the private sector——

Mr. THOMAS. To quote Mr. Evins, and I think he put his finger on it, you are going to do better what your predecessors have been attempting to do for some 6 or 7 years.

Mr. COSGROVE. Thank you, sir. We hope so. We certainly intend to try.

Mr. MCDERMOTT. There are two other aspects to that which might clarify this a little bit.

Mr. JONAS. I have not yet gotten an answer to my question.

DEFINITION OF "RESOURCES MANAGEMENT"

What do you mean by "resource management"?

Mr. COSGROVE. If I might comment on that, Mr. Jonas, the term "resource management" means control of the whole range of resources, th economic strength and wealth of the country, the potential wealth of the community, whether it be a national community, a State community, or a limited area, for national security.

Mr. JONAS. It is not my turn yet to engage in general questions but this is on this point and should be directed to the Director if the gentleman will still yield.

On page 8 of your statement you said you intend under this program to enable the State and local governments to create the capability of managing their own resources until the Federal direction and control can be restored.

Mr. MCDERMOTT. Yes, sir.

Mr. JONAS. You mean the Federal Government is in control of all the resources of the country now?

Mr. MCDERMOTT. Generally speaking, sir, in a cold war situation and in anything short of a hot war——

Mr. JONAS. I think it is gradually getting control but not with my concurrence and approval.

I was disappointed to hear you say in your opening statement that that is the position you want to get back to after the States relinquish

it and return it to the traditional control of the Federal Government. Did I misunderstand you?

Mr. McDermott. We are talking about a wartime economy, sir.

The fact is that in a wartime economy, if there should be a nuclear attack upon this country, it is the opinion of the best military experts and advisers that we would have a likely situation where there would be substantial areas of survival throughout this country where there would be many surviving people and many surviving industries and many surviving economic goods, but there may be such damage and disruption to the Federal structure that those States, those areas, and those communities would be on their own in terms of resource management for an indefinite period of time until communications and Federal direction was fully restored.

Mr. Jonas. What do you mean?

Mr. McDermott. The entire economic resource of the particular community.

RESOURCE EVALUATION

Mr. Jonas. Take my community, for example. What do you envision would come out of this conference where we manufacture furniture, textiles, hosiery, and where we have farms?

Mr. McDermott. As a practical matter, sir, what would come out of this program in terms of your community is that the governmental and nongovernmental leadership of your State would, we believe, on the basis of our investigation, for the first time take a hard look at what its problems would be in a nuclear postattack period if it were surviving in a nation where there had been very substantial damage if it did not have available Federal programs for the management of resources, for the rationing of available goods, for the determination of priorities for those available goods. We are trying to get the governmental leadership, assisted by nongovernmental leadership, and the response has been very good, to evaluate their own resources, to determine the areas of their inadequacy, to determine what might be done in terms of revised planning to reduce the degree of their dependency upon outside sources, and to develop plans which could be effective in a postattack period which would permit the management of their economy until order was restored from the chaos which would result.

AREA CONFERENCES

Mr. Jonas. Are you sure that in addition to your own predecessor agencies the Department of Commerce has not been engaged in this same study for years? I think we permitted them to participate in buying a big computer to install at the University of North Carolina as a pilot plan. One of the justifications was that they were going to canvass every resource in the entire United States and have it laid out on the table where it could be understood and kept up.

Mr. McDermott. I understand that has been done, sir. The results of that study alone do not create the capability at State and local levels to deal with this problem in the postattack period.

I might tell you that in the one area conference which has been held so far, and that was in the city of Pittsburgh, the response of Government and industry was most encouraging. There were 450

Government, industry, and labor leaders who attended that all-day conference. They recognized the problems in this area and I believe they are going to respond.

In the State of Hawaii, which is a unique situation because it is a noncontiguous character in relation to the mainland and because it is the one part of our country which knows the suddenness with which attack can occur, Governor Quinn has been interested in this program and it has been initiated on a statewide basis. The top business and leadership of the island has responded to this problem.

Dr. Hitch, vice president of the First National Bank of Hawaii is assuming a leadership role in approaching this problem from the standpoint of the State of Hawaii.

Mr. JONAS. I hope you do not misunderstand me. I think planning is necessary. The reasons for my questions were twofold: First, I think it already has been done; I certainly hope it has. Secondly, I wanted to see how practical your program is. You can do a lot of writing of manuals and do a lot of generalizing but I would like to see some evidence of what your survival plan is for X State.

Mr. MCDERMOTT. We will give you further specifics on that. I want to tell you this with reference to past programs in this area. I believe independent inquiry in your respective States will confirm that as a result of civil defense emphasis and orientation in OCDM, while emergency planning was an area of responsibility, and while it received some attention, it didn't receive the attention in our opinion that it required.

Secondly, with reference to its predecessor, ODM, which had this responsibility, the nature of the threat has changed very substantially since the days of ODM and we are dealing with a different type of problem.

Specifically on how it will be done and what the States can do, Mr. Brewton, the Assistant Director in this area is very familiar with this program and has developed the guides and the manuals and I think he would be prepared to respond to your specific questions, Mr. Congressman.

Mr. EVINS. This is to make them stand on their own feet, to suggest they stand more on their own feet and assume more responsibilities, and also to make them alert to the problem.

Mr. MCDERMOTT. That is right.

Mr. EVINS. I should judge from what you say that the Governors and State officials welcome this assistance. They want all the assistance that can be given to them.

Mr. MCDERMOTT. That is right.

Mr. EVINS. They are generally opposed publicly to Federal aid but when they can receive assistance they welcome it.

Mr. MCDERMOTT. This is to assist them in creating a higher degree of capability than they now have.

PROGRAMS AND AREAS OF RESPONSIBILITY

Mr. OSTERTAG. Mr. Director, we have witnessed a number of changes in the structure, area of responsibility, and organization over the years as it relates to defense mobilization, as it relates to civil defense, as it relates to emergency planning, as it relates to disaster and other emergency types of situations.

If I may, I would like to develop, before we embark on discussion and consideration of your justifications, the general responsibilities which were those of the Office of Civil and Defense Mobilization, the programs, activities, and services as they compare now with the Office of Emergency Planning, or, more particularly, that area which was transferred to the Defense Department. I also would like to know what remains in your organization, and couple that with the question the chairman asked, and that is what is new in the whole picture so far as OEP is concerned.

I think if we had a clear-cut picture in the areas of responsibility and transfers by virtue of Executive orders we could perhaps deal with this entire problem more intelligently.

Mr. McDermott. I shall try and answer that succinctly for you because you know the background of it perhaps as well as anybody in this room, you and the members of your committee.

EFFECT OF EXECUTIVE ORDER 10952

With reference to civil defense, the effect of Executive Order 10952 was to transfer all of the operating responsibilities in the civil defense program out of OCDM. That is all gone. The only civil defense responsibility that remains in the Office of Emergency Planning is an overall coordinating responsibility, to coordinate civil defense with other programs in the emergency planning area. We have ceased being an operating agency. We are not engaged in any civil defense operation per se.

What has happened in the reconstituted Office of Emergency Planning is that all of the traditional program obligations of OCDM as you understood them, with the exception of that segment relating to civil defense responsibilities, remains.

The President has also given certain of these programs a new sense of urgency.

He feels on the basis of the study he made with reference to civil defense he came to the conclusion that the state of our preparedness in the resource area also was in poor shape, so a new emphasis and direction has been given to the responsibilities which originated back with ODM. The new urgency and new emphasis is due to the changing nature of the threat and the world in which we live.

Mr. Ostertag. How do you define the change in the nature of the threat? We have been confronted with this sort of emergency for some time. What change do you mean has taken place?

Mr. McDermott. The change particularly from the conventional type of weapon and means of delivery which antedated the nuclear missile to the realities of war today which contemplates a nuclear missile exchange. The degree of devastation certainly has every prospect of being greater, and the problems it imposes on our economy in terms of survival and rehabilitation and restoration and recovery are different than they would have been in dealing with a nonnuclear type of weapon.

Mr. Thomas. We have all known that Russia has had an atomic bomb for at least 5 or 6 years.

Mr. Ostertag. Or more. That is the point I was trying to get at.

Mr. McDermott. The only explanation I can give you for that, sir, is that there has been a change every year, every month, not necessarily a change for the better in terms of the types of weapons with which we are dealing.

This area, while it was a program responsibility, was given second treatment to civil defense program responsibilities in OCDM.

Mr. Ostertag. If I understand you correctly, practically all of the civil defense responsibilities and functions have been transferred from OCDM to the Office of Civil Defense.

Mr. McDermott. That is right.

Mr. Ostertag. That is in the Defense Department.

Mr. McDermott. That is correct.

Mr. Ostertag. OCDM no longer exists but we have an Office of Emergency Planning.

Mr. McDermott. That is correct.

Mr. Ostertag. Under the old organizational setup you people were responsible for a number of programs in Civil Defense from many applicable angles, including that of assistance to the States and communities, aid in one form or another, and also jurisdiction over the direction of civil defense organizations throughout the country.

TRANSFER OF CERTAIN FUNCTIONS TO DOD

By way of organization what has been transferred to the Defense Department?

Mr. McDermott. We have transferred to the Defense Department since the issuance of Executive Order 10952 1,103 people who formerly were with OCDM. Those were people where a job analysis indicated they had operating Civil Defense responsibilities within OCDM. When the functions went to OCD people went with them. We transferred 1,103 people. We transferred 39 people to other departments and agencies which had Civil Defense responsibilities in the operating field.

Mr. Thomas. State what those functions were.

Mr. McDermott. The shelter program, the radiological monitoring and defense program, the communications and warning program, the Federal contributions program, all of the programs that are generally identified with civil defense.

Mr. Ostertag. I would like to raise this question in a little different way. What was the total organizational structure of OCDM at the time of the Executive order and the transfer?

Mr. McDermott. In terms of people or programs?

Mr. Ostertag. People.

Mr. McDermott. The total personnel was 1,650 positions. Of those, 1,103 were transferred to the Office of Civil Defense in the Department of Defense, and 39 were transferred to other departments of Government, leaving in OEP, as a result of the issuance of Executive Order 10952, 513 positions, on August 1, 1961.

Mr. Ostertag. And they all remain with OEP?

Mr. McDermott. That is right.

Mr. Ostertag. So that the whole organization under OCDM has been absorbed by either the Defense Department, OEP, or other transfers?

Mr. McDermott. That is correct.

Mr. Ostertag. What has happened to your Battle Creek operation?

Mr. McDermott. Because most of the operating aspects of the civil defense program in OCDM were in Battle Creek, at the time of the transfers incident to Executive Order 10952 we transferred the facility at Battle Creek to the Department of Defense, that is the physical structure, and the great bulk of the 1,103 people that were transferred to OCD were also stationed and working there. The facility has been transferred to the Office of Civil Defense.

I understand a decision has been made in the Office of Civil Defense to bring the people who were in Battle Creek, at least many of them, to Washington as part of the OCD staff here and to turn that facility over to another element of the Department of Defense.

I believe this is Gen. Andrew McNamara's purchasing and supply department. I am not prepared to speak authoritatively on the current plans of the Department of Defense on that.

GENERAL AREAS OF RESPONSIBILITY OF OEP

Mr. Ostertag. Within the framework of OEP you list, among the general areas of responsibility, that of executive direction, emergency planning, resources and production planning, and research and development. Does that pretty much constitute the area of responsibility and the objectives of the OEP?

Mr. McDermott. That is correct, sir. That is essentially what we feel is the most logical division and breakdown of our personnel groups.

Mr. Ostertag. From those four categories what was not included in the responsibilities and functions of OCDM? I am asking the chairman's question in another way.

Mr. McDermott. The answer to that, sir, is that there are no new programs which you would identify with a label. It is an increased emphasis on those existing programs plus some additional things which have occurred as part of our advisory role to the President in the area of nonmilitary defense in the form of specific assignments, particularly those forthcoming in the past 6 weeks and which will continue in the future.

STOCKPILE RESPONSIBILITIES

Mr. Ostertag. You mentioned, Mr. Director, that you had a Cabinet committee to make recommendations to the President with regard to what can and should be done with the stockpile.

Mr. McDermott. That is correct, sir.

Mr. Ostertag. Of course, since that time, or at about that time, the Congress, through a Senate committee, has embarked on an investigation of this whole problem and the issue involved. In light of the responsibilities of the General Services Administration for the management of the stockpile, and in view of the responsibilities which were previously under OCDM, I am wondering what does OEP have to do with the stockpile, what are your responsibilities, if any, and where do they fit into this picture?

Mr. McDERMOTT. None of the responsibilities of OCDM with reference to any of the stockpile programs were involved in Executive Order 10952 or transferred to the Department of Defense or other departments, so therefore all of the responsibilities which rested with OCDM in this area remain with OEP.

Mr. OSTERTAG. In other words, those responsibilities which were those of OCDM now remain in OEP?

Mr. McDERMOTT. That is correct, there is no change in that.

STATE CIVIL DEFENSE ORGANIZATIONS AND LEGISLATION

Mr. OSTERTAG. You referred to the program of the States. Mr. Evins touched on this whole question, as did others.

Mr. JONAS. You mentioned decisive support has been given this program by the Council of State Governments and many other national organizations.

Mr. McDERMOTT. That is correct.

Mr. OSTERTAG. Over the years, ever since the inception of emergency situations, wars and otherwise, civil defense organizations have been in being, and many, if not all, of the States have enacted laws and established civil defense organizations within the State structures.

Can you tell me offhand how many States today have adequate and appropriate civil defense laws?

Mr. McDERMOTT. I would like to clarify the reference to the Council of State Governments first. I am talking about it in this reference in connection with their support of the continuity of government program which is our agency responsibility. They have also been active in the civil defense field.

With reference to the status of civil defense legislation as opposed to continuity of government, I cannot speak authoritatively on the current status of civil defense legislation in the States because I have personally had very little contact with it. The program was transferred to OCD very shortly after my arrival.

I do know, however, that every State has a State Civil Defense Director. I know that there is an on-going civil defense activity in each State. I know that the degree of activity and the degree of response varies from State to State, and the quality of the performance of the civil defense organization in each State varies with the personnel identified with the program.

However, I believe all States do have some form of civil defense legislation and organization which is effective in varying degrees today.

Mr. OSTERTAG. Will these State civil defense organizations, by virtue of State laws, have any particular place and authority and responsibility in case of an emergency?

Mr. McDERMOTT. I believe in the preattack period and in the period of the civil defense emergency itself that they will have a position of authority. That position of authority will be as determined by the Federal program and as determined by the action of the respective Governors.

EFFECT OF FEDERAL REORGANIZATION ON STATE RESPONSIBILITIES

Mr. OSTERTAG. In view of the change in organization and the structure of Civil Defense and Emergency Planning on the national and Federal level, what effect will that have on organization, operation and function in States and communities throughout the country? In other words, the Defense Department has quite a large part in the overall program. Will that require changes throughout the country in view of the two-headed system we have here at the national level, namely, OEP and Defense?

Mr. MCDERMOTT. I envision no need for any immediate change or any duplication. The Civil Defense responsibility in terms of its termination in an emergency is difficult to identify on a calendar or with a ruler, but it certainly extends through the attack period and through early phases of postattack rehabilitation.

However, the programs for which we are responsible are directed primarily toward the rehabilitation and restoration of our economy at State and local levels and nationally.

REVISION OF STATE LEGISLATION

Mr. OSTERTAG. Will that require a change at the State level?

Mr. MCDERMOTT. In terms of organization, possibly. It would be up to the Governor.

Mr. OSTERTAG. In terms of State laws?

Mr. MCDERMOTT. That varies with the State. Generally it is felt that the emergency powers of the Governor, if there would be an emergency existing, the emergency powers of the Governor would be adequate to cover this.

Mr. OSTERTAG. What I am getting at, and this is all in the spirit of trying to determine what needs to be done, is this: I am somewhat familiar with the early days of Civil Defense organization and the sponsorship of the program through the Council of State Governments and others. I am wondering whether at this point your organization, the OEP, and the Defense Department might well require a reexamination and a reprograming of a legislative program throughout the States generally to meet this type of setup.

You were discussing with Mr. Jonas and Mr. Evins a few moments ago the resources planning.

Mr. MCDERMOTT. In the States. That is correct.

Mr. OSTERTAG. In a sense that is something new insofar as you people are concerned.

Mr. MCDERMOTT. That is correct.

Mr. OSTERTAG. Yet I am not so sure that that fits into what has previously been done at the State level by way of their authorities and their State laws. In other words, does this not require a new look, a new approach, and a new program by the States collectively?

Mr. MCDERMOTT. Yes, it does. I would like Mr. Gallagher to respond to the status of the ongoing activity.

Mr. OSTERTAG. I know he is familiar with what has been done.

Mr. GALLAGHER. The Council of State Governments has a drafting committee on State legislation. We are working jointly with them on a review of State civil defense and defense mobilization legislation.

We are also working jointly with the Civil Defense Committee of

the Governors' Conference, reviewing what should be done in the legislative field.

Mr. OSTERTAG. While they will be before us to justify their budget I suspect that this program entails a much heavier manpower organization by virtue of coordinating both military and civil defense responsibilities.

Mr. MCDERMOTT. It does, but in terms of our own responsibilities we feel that our responsibilities can be handled with a total of 450 people.

Mr. THOMAS. This has been a very helpful discussion.

FUNDING OF EMERGENCY PREPAREDNESS ACTIVITIES

Insert this letter from the Director of the Budget in the record at this point.

(The letter referred to follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 9, 1962.

Hon. ALBERT THOMAS,
Committee on Appropriations,
House of Representatives,
Washington, D.C.

DEAR MR. THOMAS: Enclosed is a comparative table on the current and proposed funding of Federal agency emergency preparedness activities which you may find helpful in your forthcoming hearings on the 1963 estimates for these activities. The table was prepared at the request of Senator Robertson for the use of the Independent Offices Subcommittee, Senate Committee on Appropriations. Also enclosed is a copy of the letter I sent to Congressman Cannon today which outlines in some detail the considerations involved in funding this program.

The amounts shown in the table for the Office of Emergency Planning, the Office of Civil Defense, and for the medical stockpiling program assigned to the Department of Health, Education, and Welfare are the entire amounts requested to support these operations. With regard to the other departments and agencies listed, however, the amounts indicated are only those which are separately identifiable for emergency preparedness activities. These amounts are generally separable only because the activities supported by these funds are comparable to those which were formerly supported from the appropriation, "Civil defense and defense mobilization functions of Federal agencies."

As stated in my letter to Congressman Cannon, aside from the method by which the Congress reviews the budgets for all of these activities, it is hoped that favorable consideration will be given the recommendation of the President that emergency preparedness functions of departments and agencies, whether separately identifiable or otherwise, be appropriated for directly to the agencies assigned program responsibilities by the President.

Sincerely yours,

DAVID E. BELL, *Director.*

Funding of emergency preparedness activities

[In thousands of dollars]

	Fiscal year 1962			Fiscal year 1963 budget estimate
	Appropriation	Appropriation transfers	Program funding [1]	
OEP	$85,550	−$71,865	$14,685	$11,000
OCD	207,600	49,432	257,032	695,000
HEW (medical stockpile)	13,000	22,433	[2] 35,433	40,000
Agriculture			(344)	305
Commerce			(2,485)	2,801
FAA			(121)	200
HEW			(1,600)	2,106
HHFA			(161)	250
Interior			(429)	487
Labor			(978)	1,285
Post Office Department			(11)	11
Veterans' Administration			(17)	17
ICC			(70)	175
FCC			(15)	68
SBA			(16)	42
Treasury			(67)	80
Total	307,150	0	307,150	753,827

[1] Figures in parentheses indicate funding supplied by OEP and OCD.
[2] Does not include comparative transfers of $314,000 from OEP.

Summary of Budget Estimates

Mr. Thomas. The summary tables are quite excellent. Let me call your attention to the summary on page 1 which shows actual estimates for 1963, $11 million. That gives a summary of the predecessor agency for 1961, 1962, and your own needs. The only new item you have is the postattack planning, $3 million. The item of salaries and expenses shows $8 million.

This shows that the civil defense mobilization functions of Federal agencies have been transferred.

Federal contributions have been transferred, emergency supplies and equipment has been transferred, and research and development and construction have been transferred.

Insert page 1 and the appropriation history on page 2 in the record at this point.

Also insert the organizational chart on page 3 in the record.

(The pages referred to follow:)

Summary of appropriations

Appropriations	1961 actual	1962 actual	1963 estimate	1963/1962 difference
Salaries and expenses	$25,346,000	$7,930,000	$8,000,000	+$70,000
Postattack planning			3,000,000	+3,000,000
Civil defense and defense mobilization functions of Federal agencies	6,567,000	4,520,850		−4,520,850
Federal contributions	16,000,000	814,201		−814,201
Emergency supplies and equipment	9,175,000	318,841		−318,841
Research and development	4,000,000	766,200		−766,200
Construction of facilities		2,500,000		−2,500,000
Subtotal, Office of Emergency Planning	61,088,000	16,850,092	11,000,000	−5,850,092
Disaster relief, Executive Office of the President		21,000,000		−21,000,000
Total, all appropriations	61,088,000	37,850,092	11,000,000	−26,850,092

Appropriation history

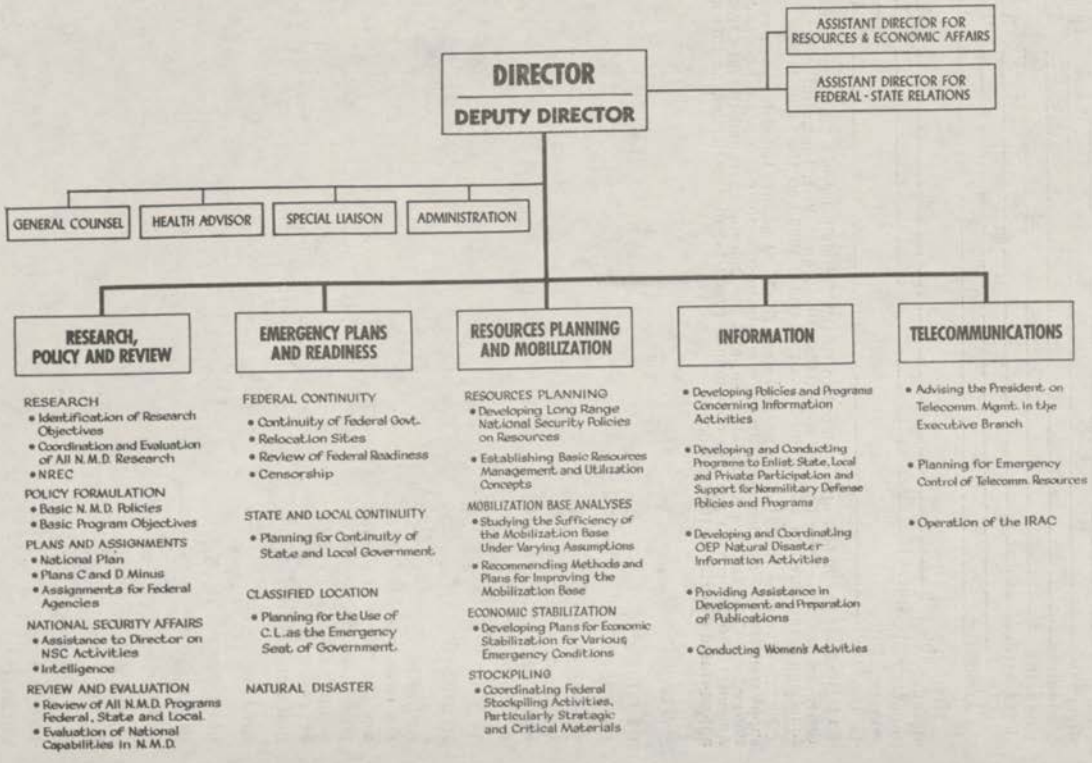
Fiscal year:	
1951	$26,750,000
1952	77,021,250
1953	44,250,000
1954	49,275,000
1955	50,186,000
1956	70,900,000
1957	95,760,000
1958	41,561,300
1959	45,285,000
1960	52,885,000
1961	61,088,000
1962	[1] 16,850,092
Subtotal	631,811,642
1963 (request)	11,000,000
Total	642,811,642

[1] Excludes $69,699,908 appropriated to OCDM for civil defense functions transferred to the Secretary of Defense by Executive Order 10952 on Aug. 1, 1961, and medical stockpile functions transferred to DHEW by Executive Order 10958 on the same date.

NOTE.—Excludes civil defense procurement fund. Amounts listed for each year include supplementals and deficiencies. Prior year data include the Office of Defense Mobilization, the Federal Civil Defense Administration, and the Office of Civil and Defense Mobilization. Amounts listed for each year do not include funds for disaster relief, as this account is appropriated directly to the President.

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF EMERGENCY PLANNING



INTRODUCTORY STATEMENT

Mr. THOMAS. This is an introductory statement well worth your attention on pages 4 and 5. Let me read some significant parts.

The Office of Emergency Planning's principal responsibility is assisting the President in the planning and administration of the Nation's nonmilitary defense, a job which can properly be viewed only in the broader perspective of the total national security effort. Political and economic defense planning, and direct military preparations are mutually dependent and must be planned within a common framework of concepts and assumptions. Every point in the preparations for nonmilitary defense is affected by, or affects, the national military defense plans and objectives.

They go hand in hand.

Nonmilitary defense is composed of two principal elements. One is civil defense, the direct responsibility for which has been assigned to the Department of Defense. The other part is concerned with the preservation, or reconstruction, of national political and economic structures and systems. This is the responsibility of the Office of Emergency Planning. The Government and the economy must be prepared to support national security objectives, and, more important, to preserve those political and economic freedoms which distinguish us from our enemies.

We are getting down to bedrock.

The next paragraph is good. This paragraph is where the reputation comes in:

The principal categories of planning—

of course, that word is so broad and indefinite, it covers a multitude of sins, as well as mistakes—

The principal categories of planning in which OEP is engaged are the preservation of our national political structure, the preservation and use of Government organizations, facilities and personnel, including the temporary conduct of Government business from other places.

You will have some 8 or 10 other governmental agencies to come in and justify their own parts of the program. You say:

including the temporary conduct of Government business from other places, and the preservation and use of the economy. By far the most complicated of these are the plans for using the economy to sustain the Nation in its national purposes; and to preserve its identity and recreate its abilities if an attack should occur. OEP is concerned with plans and preparations for the most effective use of resources to support national security objectives, including creation and maintenance—

and listen to this—

of emergency stockpiles where necessary.

They are running out of our ears.

Let those be my words, not yours.

The Agency is also concerned with emergency plans for highly sophisticated fiscal, credit, and monetary systems—

and I have up there one I would let the Federal Reserve Board tend to. They have done a pretty good job of it in the past. You are concerned—

with direct wartime controls over resources.

The Department of Commerce has had a unit over there ever since it was bound up in your shop in 1956 doing planning on rent control, allocation of materials, price control, et cetera.

Finally, the agency is concerned with the planning in the extremely sensitive area of national and international telecommunications.

We are going to discuss this with Dr. Stewart later.
That is all good reading. It is worth while.

Salaries and Expenses

Object classification

[In thousands of dollars]

		1961 actual	1962 estimate	1963 estimate
	OFFICE OF EMERGENCY PLANNING			
11	Personnel compensation:			
	Permanent positions	14,045	5,520	4,480
	Positions other than permanent	387	200	164
	Other personnel compensation	266	92	65
	Total personnel compensation	14,698	5,812	4,709
12	Personnel benefits	1,051	408	335
21	Travel and transportation of persons	919	390	325
22	Transportation of things	244	73	35
23	Rent, communications, and utilities	2,725	197	166
24	Printing and reproduction	1,193	238	300
25	Other services	6,710	966	1,710
	Services of other agencies	514	294	170
26	Supplies and materials	300	59	75
31	Equipment	524	47	155
	Unvouchered	3	3	
	Total, Office of Emergency Planning	28,881	8,487	7,980
	ALLOCATION ACCOUNTS			
11	Personnel compensation:			
	Permanent positions	358	143	17
	Positions other than permanent	13		
	Other personnel compensation	3	1	
	Total personnel compensation	374	144	17
12	Personnel benefits	42	17	3
21	Travel and transportation of persons	34	7	
22	Transportation of things	6	3	
23	Rent, communications, and utilities	8	2	
24	Printing and reproduction	8	41	
25	Other services	1,320	66	
	Services of other agencies	4	1	
26	Supplies and materials	9	1	
31	Equipment	77	4	
32	Lands and structures	111		
	Total, allocation accounts	1,993	286	20
	Total obligations	30,874	8,773	8,000
	Obligations are distributed as follows:			
	Office of Emergency Planning	28,881	8,487	7,980
	Atomic Energy Commission	−5		
	Department of Agriculture		114	
	Department of the Army	70		
	Department of Commerce		51	
	Department of Health, Education, and Welfare	1,695	121	20
	General Services Administration	233		

Personnel summary

	1961 actual	1962 estimate	1963 estimate
OFFICE OF EMERGENCY PLANNING			
Total number of permanent positions	1,650	500	500
Full-time equivalent of other positions	86	126	36
Average number of all employees	1,731	618	496
Number of employees at end of year	1,730	525	475
Average GS grade	9.6	10.4	10.4
Average GS salary	$8,556	$9,614	$9,687
ALLOCATION ACCOUNTS			
Total number of permanent positions	48	19	1
Full-time equivalent of other positions	2	----	----
Average number of all employees	41	14	1
Number of employees at end of year	46	19	1
Average GS grade	9.1	10.3	----
Average GS salary	$7,940	$9,481	----

Program and financing

[In thousands of dollars]

	1961 actual	1962 estimate	1963 estimate
Program by activities:			
1. Executive direction	3,126	3,221	2,944
2. Emergency planning	2,159	1,938	1,960
3. Resources and production planning	2,082	1,865	1,596
4. Civil defense	17,787	906	----
5. Research and development	5,720	843	1,500
Total obligations	30,874	8,773	8,000
Financing:			
Comparative transfers from (−) other accounts	−5,720	−843	----
Unobligated balance lapsing	192	----	----
New obligational authority	25,346	7,930	8,000
New obligational authority:			
Appropriation	25,346	25,000	8,000
Transferred to:			
"Operation and maintenance, Civil defense," Defense (64 Stat. 665)	----	−16,800	----
"Civil defense medical activities," Public Health Service	----	−270	----
Appropriation (adjusted)	25,346	7,930	8,000

Mr. THOMAS. Put the green sheet on page 7 in the record.
(The page referred to follows:)

Summary of obligations by activities

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
1. Executive direction	$3,125,776	$3,220,826	$2,944,300	−$276,526
2. Emergency planning	2,158,662	1,938,300	1,959,800	+21,500
3. Resources and production planning	2,082,435	1,864,800	1,595,900	−268,900
4. Civil defense	17,786,746	906,074	----	−906,074
5. Research and development	5,720,210	843,289	1,500,000	+656,711
Total obligations	30,873,829	8,773,289	8,000,000	−773,289
Comparative transfers from (−) other accounts	−5,720,210	−843,289	----	+843,289
Unobligated balance lapsing	192,381	----	----	----
New obligational authority (appropriation)	25,346,000	7,930,000	8,000,000	+70,000

Mr. THOMAS. This shows an increase of $70,000 over last year, a total of $8 million.

Executive direction is $2,944,300, which you state is a decrease of $276,500 from 1962; emergency planning, $1,959,800, an increase of $21,500 over 1962; resources and production planning, $1,595,900, a decrease of $268,900; Research and development, $1.5 million, an increase of $656,711 over 1962.

Then you have your comparative transfers, et cetera.

OBLIGATIONS BY OBJECT CLASSIFICATION

Let us refer to 8. It is worthwhile. For travel and transportation, $325,000, a decrease of $22,600; transportation of things, $35,000, a decrease of $38,500; printing and reproduction, $300,000, which is an increase of $61,550. We really have been doing a lot of printing. We still go up. We transferred three-fourths of the organization. Yet the printing bill went up $61,000.

Supplies and materials cost $75,300. That is an increase of $16,600.

Other services, including services of other agencies is increased $398,000 over 1962. Equipment is $154,700, an increase of $107,900.

Let us put the table on page 9 in the record.

(The table referred to follows:)

Appropriation history

Fiscal year:	
1951	$1,750,000
1952	[1] 13,271,250
1953	9,250,000
1954	11,275,000
1955	12,186,000
1956	14,350,000
1957	17,760,000
1958	[2] 19,261,300
1959	[3] 20,785,000
1960	[3] 23,285,000
1961	[4] 25,346,000
1962	[5] 7,930,000
Subtotal	176,449,550
1963 (request)	8,000,000
Total	184,449,550

[1] Includes supplemental of $365,000 to cover Pay Act costs.
[2] Excludes transfer of $119,779 from "Emergency supplies and equipment" to cover Pay Act costs.
[3] Excludes amounts appropriated for functions of other agencies which are shown under "Civil defense and defense mobilization functions of Federal agencies," as follows: 1959, $500,000; 1960, $6,250,000.
[4] Includes supplemental of $646,000 due to pay increase.
[5] Excludes $17,070,000 appropriated to OCDM, but transferred to Department of Defense and DHEW with functions transferred by Executive Orders 10952 and 10958.

NOTE.—Amounts listed for each year include supplementals and deficiencies. Prior year information includes the Office of Defense Mobilization, the Federal Civil Defense Administration, and the Office of Civil and Defense Mobilization.

Mr. THOMAS. This lists appropriation history since 1951. It gives you the footnotes, which are self-explanatory.

EXECUTIVE DIRECTION

Let us put page 10 in the record.
(The page referred to follows:)

Executive direction—Recapitulation of obligations

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Direction	43	42	38	−4
Administration	95	84	59	−25
Area offices	112	113	90	−23
Total	250	239	187	−52
Full-time equivalent of all other positions	21	20	20	
Average employment	266	255	222	−33
Personnel compensation:				
Direction	$432,504	$485,200	$462,700	−$22,500
Administration	726,574	615,700	493,800	−121,900
Area Offices	1,141,107	1,205,100	1,009,500	−195,600
Total	2,300,185	2,306,000	1,966,000	−340,000
Personnel benefits:				
Direction	29,113	33,500	32,000	−1,500
Administration	50,437	42,500	34,200	−8,300
Area offices	80,663	83,320	69,700	−13,620
Total	160,213	159,320	135,900	−23,420
Supporting costs:				
Travel and transportation of persons	196,756	195,106	172,000	−23,106
Other objects	468,622	560,400	670,400	+110,000
Total	665,378	755,506	842,400	+86,894
Grand total	3,125,776	3,220,826	2,944,300	−276,526

GENERAL STATEMENT

This activity provides for staff assistance to the President in coordinating the nonmilitary program for the defense of the United States. Included also are area offices which work with Federal agencies and seek to mobilize State, local, and private participation in nonmilitary defense. In addition, the administrative services, advisory functions, and liaison activities are financed by this activity.

AREA OFFICES AND EMPLOYMENT

Mr. THOMAS. We are getting down to some cases. You have area offices. How many employees did you have in your eight area offices in 1961 and 1962?

Mr. RICE. How many did we have in area offices?

Mr. THOMAS. In 1961 and 1962.

Mr. RICE. In 1962, 143 total in the field; 30 of those are for 2 classified sites and the remainder of 113 are area offices.

Mr. THOMAS. Were these your eight big area offices located in Boston——

Mr. MCDERMOTT. They are in Harvard, Mass.; Olney, Md.; Thomasville, Ga.; Battle Creek, Mich.; Denver, Colo.; Denton, Tex.; Santa Rosa, Calif., and Everett, Wash.

EMPLOYMENT IN AREA OFFICES

Mr. THOMAS. What was the total employment in those eight offices?

Mr. RICE. This current fiscal year, 113.

Mr. THOMAS. What were they in 1961?

Mr. RICE. Our OEP part?

Mr. THOMAS. I am not talking about our part.

Mr. RICE. 112.

Mr. THOMAS. I want to know what the total employment in those eight offices was. We had a figure of 660.

Mr. RICE. We had 112 in the area offices for OEP work.

Mr. THOMAS. I am asking for the total employment in 1961 before the office was split up. OCDM had 660 if my memory serves me correct.

Mr. MCDERMOTT. That is approximately correct, sir.

Mr. THOMAS. Of that 660 how many do you maintain now?

Mr. MCDERMOTT. We have on board at the present time——

Mr. THOMAS. 90?

Mr. MCDERMOTT. We propose the 90 for fiscal year 1963.

Mr. THOMAS. How many do you have on board now?

Mr. MCDERMOTT. 113 is the current ceiling.

Mr. THOMAS. What became of the remainder of the 660?

Mr. MCDERMOTT. They were transferred to OCD.

Mr. THOMAS. What do your 113 do since you transferred the office and facilities over to Defense?

Mr. MCDERMOTT. We have not fully transferred all of the facilities. The Area Offices of the Office of Emergency Planning are maintained in those same locations. Our area field personnel deal with the States in their respective areas in our program responsibilities. We are separate and physically distinct from OCD.

Mr. THOMAS. Again, I am referring to my memory. The Department of Defense wants 600 to do the same function. That gives you a total of about 713 in these same eight offices.

Mr. RICE. When the division of responsibilities took place between OEP and OCD in both headquarters and the field, our OEP area office people added up to about 113.

Mr. THOMAS. Break them down by numbers as to each of your eight regional offices.

Mr. MCDERMOTT. In terms of onboard people?

Mr. RICE. We don't have them by area for next year. They average at the moment 14.

Mr. THOMAS. If you don't have them by region how can you come up with a definite figure for overall then?

Mr. MCDERMOTT. He has the total figure, sir.

Mr. THOMAS. How many people do you have on board in your eight regional offices as of March 1?

Mr. RICE. 113.

AREA OFFICE STAFFING BY LOCATION

Mr. THOMAS. Where are the 113 located?

Mr. MCDERMOTT. In the eight area offices that I just enumerated.

Mr. THOMAS. We know that. I am asking you how many you have in each office.

Mr. RICE. Area 1, 16; area 2, 11.

Mr. THOMAS. Where is area 1?

Mr. RICE. Harvard, Mass.

Mr. THOMAS. You have how many?

Mr. RICE. Sixteen.

Mr. THOMAS. In Boston?

Mr. RICE. At Olney, we have 11.

Mr. THOMAS. Olney, 11.

Mr. RICE. Area 3, which is Thomasville, Ga., we have 17; area 4, Battle Creek, we have 10; area 5, Denton, Tex., we have 14; Denver, area 6, we have 10; area 8, which is Everett, Wash., we have 11; and area 7 at Santa Rosa, Calif.——

Mr. THOMAS. You have 11 in Everett?

Mr. RICE. Yes, and at Santa Rosa we have 14.

Mr. THOMAS. That is in California?

Mr. RICE. Yes, sir.

Mr. THOMAS. You are going to reduce that to how many?

Mr. RICE. A total of 90. We feel there might be some equalization. It is a little unbalanced at the moment.

PERSONNEL IN WASHINGTON, D.C.

Mr. THOMAS. You have in the District of Columbia how many?

Mr. RICE. We have a ceiling of 310. As of today, 302 are aboard, and the others are in the process of recruitment for vacancies and turnover.

Mr. THOMAS. For your 1963 estimate, you will have 97, is that correct?

Mr. JONAS. Pardon me, Mr. Chairman. They lost 10. Those figures add up to 103. They said 113.

Mr. WALL. Yes, sir. He was reading the January 31 employment rather than the ceiling figures.

Mr. THOMAS. You will have 97 as against 126 for 1962 in the District of Columbia; is that correct?

Mr. RICE. No, sir.

Mr. THOMAS. Straighten it out, then.

Mr. RICE. Are you talking about our headquarters part of the organization at the present?

Mr. THOMAS. Yes. Where is it going to be? Is it in the District of Columbia?

Mr. RICE. Yes, sir, District of Columbia. We propose 330 positions in the District of Columbia for next fiscal year.

Mr. THOMAS. How many did you have last year?

Mr. RICE. Three hundred ten.

Mr. THOMAS. You had 310 in the District of Columbia?

Mr. RICE. Yes, sir.

Mr. MCDERMOTT. At that point, sir, let me observe——

Mr. THOMAS. That is for 1962?

Mr. RICE. That is right. That is for the end of 1962, sir.

Mr. THOMAS. How many will you have in 1963 in the District of Columbia?

Mr. RICE. 330 by the end of the fiscal year.

Mr. THOMAS. 330 plus your 97 in the field?

Mr. RICE. In the area offices it is 90, sir, rather 97. We think we can do the job with 90.

Mr. THOMAS. You reduce it down to 90 from 97?

Mr. RICE. Yes, sir.

Mr. WALL. We have 90 for the field, 30 for the classified sites, making 120, and we propose the balance in the District of Columbia.

Mr. RICE. When we say "field," that includes the main classified site and five positions at the other site.

TOTAL EMPLOYMENT

Mr. THOMAS. What does that give you in total employment for 1963 against 1962?

Mr. RICE. 450 positions as against——

Mr. THOMAS. 450 for 1963; what is 1962?

Mr. RICE. As against the peak figure of 500 in 1962. That is against the 551 positions that remained with OEP at the time of the split.

Mr. THOMAS. You have 330, I believe, in the District of Columbia.

Mr. RICE. We are budgeted for that.

Mr. THOMAS. You only have 310 now.

Mr. RICE. Yes, sir. This has been one of our administrative problems in the last few months, after the Battle Creek headquarters were consolidated here for the total OEP function.

Mr. THOMAS. What are you going to do with 20 more people in the District of Columbia that you did not do last year?

Mr. RICE. We have the 20 positions broken down. We are hurting at the moment. We need people that, because of the ceiling limitation, we have not been able to recruit, 2 in research, 5 in telecommunications, and 13 for special studies of petroleum, textiles, strategic and critical materials in relation to the current stockpile matter.

SUMMARY OF EMPLOYMENT

Mr. THOMAS. You set out your activities here in the District of Columbia. Let us enumerate them now. Let us see what you are going to do and the number of people you will have. We will start in with the Directors and Assistant Directors, General Counsel, and so forth. Give us the number of people involved. We think you have always been overstaffed, certainly in the District of Columbia where we can see it. It looks like you compounded it a little this year.

Mr. RICE. Our net result, of course, is the reduction from a total of 551 down to 500 down to 450. Those are the three fiscal year totals.

Mr. THOMAS. Tell us your duties in the District of Columbia. Break it down for the District of Columbia. What are you going to do?

Mr. RICE. In the District headquarters, under executive direction, we have, of course, the Director's office itself, and the Assistant Directors' offices, and the General Counsel. We will have a reduction of four. We will have 38.

Mr. THOMAS. Thirty-eight for 1963 in the Director's office. What will they do?

Mr. MCDERMOTT. They are going to help the Director, sir, but they include the three Assistant Directors and their supporting staffs.

Mr. THOMAS. Have you got an organization chart with the employment available? I do not find it in your justifications.

Mr. MCDERMOTT. The organization chart, sir, is in the forepart of the justification. I do not know that the numbers have been listed there.

Mr. THOMAS. Where is it?

Mr. MCDERMOTT. It is this chart, sir. The numbers do not appear. It is page 3 of the book.

Mr. THOMAS. That is already in the record.

Mr. MCDERMOTT. You are asking for the numbers of people, bodies, identified in each of those functions?

Mr. THOMAS. Yes.

Mr. EVINS. Each table should have a little list of the numbers in the upper right-hand corner listing the personnel.

Mr. THOMAS. You have 38 in the Director's office. How many are in the General Counsel's office?

Mr. RICE. Nine; five professional, four clerical.

Mr. THOMAS. Is that part of the 38?

Mr. RICE. Yes, sir.

Mr. THOMAS. The General Counsel has nine. That is part of your 38?

Mr. RICE. That is right, sir.

Mr. THOMAS. Is security a part of it?

Mr. RICE. No, not of the Director's office.

Mr. THOMAS. How many do you have there?

Mr. RICE. Four people. That is in my Division of Administration.

Mr. THOMAS. You gave a figure for the area offices a while ago. What was that figure?

Mr. RICE. Ninety.

Mr. THOMAS. How many do you have in administration?

Mr. RICE. In administration, we are reducing. Last year we had 95. We are currently at 75. We are reducing to 59 next year.

Mr. THOMAS. Fifty-nine for 1963?

Mr. RICE. Yes, sir.

Mr. THOMAS. Does that 59 include your financial management, contracting, procurement, general services?

Mr. RICE. That includes all administrative services of the agency, listed on page 12.

Mr. THOMAS. Under "Executive direction," you have 20 for Director, Deputy Director, Assistant Director; 9, General Counsel; 5 health advisers; 4 special liaison; administration, 59; area offices, 90. How many does that add up to?

Mr. OSTERTAG. 187.

Mr. THOMAS. Is that correct?

Put the bottom of page 13 in the record.

(The page referred to follows:)

11 Personnel compensation

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Net permanent positions	$2,159,954	$2,114,000	$1,821,000	−$293,000
Temporary and intermittent	92,196	120,200	95,600	−24,600
Regular pay above 52 weeks	8,308			
Overtime and holiday pay	37,941	61,800	41,400	−20,400
Payments to other agencies for reimbursable details	1,786	10,000	8,000	−2,000
Total	2,300,185	2,306,000	1,966,000	−340,000

The following reductions are planned under "Executive direction" employment by the end of fiscal year 1963:

	1962 estimate	1963 estimate	1963/1962 difference
Director, Deputy Director, and Assistant Directors	22	20	−2
General Counsel	10	9	−1
Health adviser	6	5	−1
Special liaison	4	4	
Administration	84	59	−25
Area offices	113	90	−23

Mr. RICE. If you add executive direction, 38, administration, 59, and area offices as 90, it is 187, sir.

Mr. THOMAS. Where are the rest of them?

Mr. RICE. The other three are emergency planning, a decrease of one; resources and production planning, a plus of three.

Mr. THOMAS. Where are they set out?

Mr. MCDERMOTT. It begins on page 20, sir.

Mr. RICE. That is our second budget activity, "Emergency planning."

EMERGENCY PLANNING

Mr. THOMAS. Let us put pages 20 and 21 in the record.

(The pages referred to follow:)

EMERGENCY PLANNING

Recapitulation of obligations

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Permanent positions	153	126	125	−1
Full-time equivalent of all other positions	11	14	12	−2
Average employment	154	139	136	−3
Personnel compensation	$1,461,167	$1,390,000	$1,377,000	−$13,000
Personnel benefits	105,900	100,800	99,800	−1,000
Travel and transportation of persons	80,955	84,000	84,000	
Other objects	510,640	363,500	399,000	+35,500
Total	2,158,662	1,938,300	1,959,800	+21,500

GENERAL STATEMENT

Federal, State, and local plans for an emergency are reviewed and evaluated under this activity. Emphasis in 1963 is given to strengthening the ability of government at all levels to operate in an emergency. Administrative costs related to the research program are covered in the activity as well.

DETAIL OF REQUIREMENTS

(*a*) *Continuity of government.*—The estimate provides staff to identify the vulnerability of governmental facilities, processes, and systems, and to construct plans, programs, and measures necessary to reduce or eliminate the vulnerabilities and assure the continued functioning of government under any contingency. The following important elements have already been identified, plans made, and programs initiated:

(1) Preservation of essential records, to protect the rights and interests of individuals and to facilitate the continued operation or reconstitution of governments.

(2) Lines of succession, to insure the existence of duly constituted authority to direct government activity.

(3) Alternate facilities for government, to insure that the existence of government authority does not depend entirely on highly vulnerable geographical locations.

(4) Emergency plans and programs to insure rapid and successful transition from normal activities to those required under emergency conditions.

(*b*) *Censorship.*—Under broad National Security Council directives, the Office of Emergency Planning has the responsibility for coordinating and monitoring the overall planning for emergency national censorship.

(*c*) *Natural disaster assistance.*—The disaster relief activities of the Federal Government as prescribed in Public Law 875 and Executive Order 10427 are directed and coordinated by the Office of Emergency Planning. Under this program OEP provides: (1) Financial assistance to State and local governments to alleviate suffering and damage resulting from major natural disasters, (2) assistance to State and local organizations in developing plans to cope with major disasters, (3) coordination of immediate assistance by Federal field agencies when a disaster is imminent, (4) financial assistance for emergency protection, public health measures, emergency repair and temporary replacement of public facilities, temporary housing, and surplus property.

(*d*) *Research.*—Staff assigned to this activity is responsible for identifying nonmilitary defense research needs; developing a program of contract research; and monitoring research contracts to assure the delivery of timely and usable research products. It also maintains a liaison with Government and private research organizations to facilitate the exchange of research data and assists in the coordination of nonmilitary defense research programs at the Federal level.

(*e*) *National Resource Evaluation Center.*—The NREC provides a capability for estimating, by use of electronic data processing systems, the direct and indirect effects of hypothetical attacks on the United States. The center conducts analyses for use in the formulation of policy and the development of emergency plans. Its primary purpose, which goes to the heart of the OEP responsibilities, is to assist organizational elements within OEP and other Federal agencies in developing and testing feasible production programs wthin the limits of available resources in a postattack environment. Another important aspect of mobilization planning is the calculation of relative hazard to resources and geographic areas from various possible attack situations, and expressing this in terms of statistical probabilities of damage from fire, blast, and radiation. This analysis of risk is valuable in planning locaton of stockpiles, control centers, etc.

(*f*) *Policy formulation.*—Staff assigned to this activity develops planning assumptions for nonmilitary defense which are consistent with national policy, and statements of emergency planning objectives in priority terms to provide other elements of OEP and Federal agencies a framework within which to develop detailed work programs.

(*g*) *Plans and assignments.*—This activity covers development of basic planning documents for nonmilitary defense, such as the national plan for civil defense and defense mobilization and plans C and D minus. These plans must be extensively revised to reflect recent organizational and policy changes, and enlarged to cover the expanding scope of the cold war conflict. Recommendations to the President on nonmilitary defense assignments to Federal agencies, and the drafting and coordination of Executive orders covering these assignments are also covered by this activity.

(*h*) *National security affairs.*—This activity provides support for the Director, OEP, in fulfilling his responsibilities as a member of the National Security Council. It analyzes and interprets intelligence reports and estimates their nonmilitary defense policy implications. Also included is the development of a flow of technical and scientific information on current and projected weapons development, which may indicate the need for changes in national security policy.

(*i*) *Review and evaluation.*—The objective of this activity is to provide the President with an up-to-date analysis of the actual state of the Nation's readiness in nonmilitary defense. In addition, the review and evaluation function provides a basis for reexamination of program goals, operating concepts, and policies.

(*j*) *Information.*—This activity provides advice to the Director on public information aspects of nonmilitary defense; prepares press releases, arranges

press conferences and interviews, and prepares speeches for the Director and top policymaking officials. Promotional activities in connection with civil defense and defense mobilization are now largely the responsibility of operating agencies.

Mr. RICE. Emergency planning for 1961 was 153.

Mr. THOMAS. Minus one from 1962 to 1963.

Mr. RICE. Next year we are asking for only 125.

Mr. THOMAS. What are these people going to do?

Mr. RICE. This includes the continuity-of-government program.

CONTINUITY OF GOVERNMENT

Mr. THOMAS. This is your housekeeping activity and top management. Let's get down to cases. This includes "Continuity of government." How many people do you have in emergency planning?

Mr. RICE. In "Continuity of government"——

Mr. THOMAS. That is program A. How many employees do you have?

Mr. RICE. We have a total of 25 for "Continuity of government."

Mr. THOMAS. What are these people going to do?

The estimate provides staff to identify the vulnerability of governmental facilities, processes and systems, and to construct plans, programs, and measures necessary to reduce or eliminate the vulnerabilities and assure the continued functioning of government under any contingency. The following important elements have already been identified, plans made, and programs initiated.

Gentlemen, we have been carrying on this activity for years. How many people did you have doing this in 1962, how many did you have in 1961?

Mr. RICE. You are talking about "Continuity of government"?

Mr. THOMAS. Yes, sir. How many did you have in 1960?

You have been carrying this on for years and years.

Mr. RICE. Our budget document does not break it down by specific functions such as continuity——

Mr. THOMAS. How many people did you have doing this in 1960?

EMERGENCY PLANS AND READINESS DIVISION

Mr. RICE. We had a ceiling of 59 in 1962; 59 was the ceiling for the Emergency Plans and Readiness Division.

Mr. THOMAS. How many did you have in 1961?

Mr. RICE. This organizational unit, sir, was just constituted last summer with the reorganization.

Mr. THOMAS. How many did the old organization have?

That is what we are asking for. I refer to your predecessor agencies.

Mr. RICE. In "Continuity of government"?

Mr. THOMAS. Yes. That is still your function, is it not?

Mr. BREWER. Yes, sir; 78 in that functional area, but in a different organizational arrangement.

Mr. THOMAS. You went down from 78 to 59.

Mr. BREWER. In 1962 it was the 59 figure. It was 78 in 1961. In 1962 it was reduced to 59.

Mr. THOMAS. What will it be for 1963?

Mr. BREWER. In 1963 the total assigned in this organizational unit will be 58.

Mr. THOMAS. Somebody gave me a figure of 25 a while ago.

Mr. RICE. I was trying to pin down the "Continuity of government" part of the Emergency Plans and Readiness Division. There are other program elements in it.

Mr. THOMAS. What, for instance, that you have not been doing before under this?

Mr. RICE. For example, assisting or working with the other Federal agencies on improving their specific organizations and programs.

Mr. THOMAS. You have been working with them all this time. You have been liaisoning and planning and cohabitating.

Mr. MCDERMOTT. Let me make this point, sir.

Mr. BREWER. We have been working on the relocation system, Mr. Chairman.

Mr. THOMAS. What do you mean relocation? You have got the same eight regional offices you have always had on a reduced basis.

Mr. BREWER. No, sir; I meant the Federal relocation sites.

Mr. THOMAS. You mean your secret sites?

Mr. BREWER. Yes, sir.

Mr. THOMAS. It is still there, is it not?

Mr. BREWER. Yes, sir.

We have recently completed a comprehensive review of the Federal agencies, working with them to determine the status of their readiness plans for the utilization of their facilities, things of this kind.

Mr. THOMAS. We have had all of these contributing Government agencies. We have been doing business with them for years and years. You audited their plans. Is that what you did?

Mr. BREWER. No, sir.

We worked with them to help them develop their plans and also to develop basic standards to apply Government-wide.

EMERGENCY PLANS AND READINESS EMPLOYMENT

Mr. THOMAS. Let's see what your green sheets look like on this.

Mr. RICE. I can show you an actual organizational breakdown of this 58 if you would like.

The colors indicate those people who are not a part of this budget package because they are paid from the natural disaster or military construction funds. They are indicated in the orange. That is carried in an organization which we label "Emergency Plans and Readiness" which includes the "Continuity of government" function.

Mr. THOMAS. Where are your green sheets, please, sir?

Mr. RICE. We have them by the total number of positions.

Mr. THOMAS. That is good enough. Read them. What are they by positions?

Mr. RICE. We have a division director. You want just the title?

Mr. THOMAS. Yes, sir.

What is the grade of the division director?

Mr. RICE. Eighteen. We have two assistants, one in the readiness planning and one in the readiness evaluation, at 17.

Mr. THOMAS. One 18, two 17's, and how many 16's?

Mr. BREWER. One.

Mr. THOMAS. How many 15's?
Mr. RICE. Nine.
Mr. THOMAS. How many 14's?
Mr. RICE. I am sorry, eleven 15's, eight 14's.
Mr. THOMAS. How many 14's did you say?
Mr. RICE. Eight. Eight 13's.
Mr. THOMAS. That is far enough.
What do these 58 people do?

EMERGENCY MEASURES BRANCH

Mr. BREWER. They are broken down, sir, into three main units. We have an Emergency Measures Branch. Emergency Measures Branch consists of 14 people. They develop the plans in cooperation with OEP's Research, Policy and Review Division. We develop the emergency plans with the Federal agencies, consistent with the total system.

Mr. THOMAS. You have 14 people coordinating the plans of some 8 or 10 govermental agencies?

Mr. BREWER. No, sir. We are trying to develop here a system whereby we can assure the relocation of the central functions of Government, the emergency relocation of key personnel and to develop the details of a wartime organization, working with elements of other agencies.

Mr. THOMAS. This has no connection then with the contributing Federal agencies. I misunderstood you.

Mr. BREWER. We also work with the other agencies to develop with them a coordinated plan.

Mr. THOMAS. What will you do in 1963 that you did not do in 1961 and 1962?

Mr. BREWER. We are asking for four additional people in that branch.

Mr. THOMAS. I am referring to substance. What are you doing now that you have not been doing for the last 5 or 6 years in this agency?

Mr. BREWER. I know our current work program. I think we have reoriented quite a bit in the last year. We have deferred activities relating to the revision of field relocation guidelines, the development of relocation site support services that we have not been able to do because of lack of personnel this current year. We have deferred the development of a policy paper on activities of employees and movement of employees in emergency.

I can give you a list of deferred items we have not been able to do that we would hope to do with some additional personnel next year.

Mr. RICE. There is one person less in the entire division.

Mr. THOMAS. What do you accomplish after you finish?

What have you accomplished at the end of your year's work? What do you have you can put your finger on, something definite?

Mr. BREWER. There are certain things——

Mr. THOMAS. Suppose the country gets in trouble. The armed services take over the country. Every man is perhaps on his own. This distinguished group of 58 people sitting in Washington will not be able to take care of anybody in Texas or New York City.

Mr. BREWER. Of this group of 58, there are 14 in the Emergency Measures Branch. Breaking it down that way we have our State and local government continuity effort in which our people have been working to develop, mainly with the States and in some cases localities, their Continuity of Government program.

Mr. THOMAS. What plans have you formulated to date? Can you tell us about them? What are those plans? What will we do?

Mr. BREWER. At the Federal level, sir?

Mr. THOMAS. Yes.

Mr. OSTERTAG. All over.

Mr. THOMAS. Whatever you plan at the Federal, State, or other levels.

INTERAGENCY COMMUNICATIONS

Mr. BREWER. We have been aiming to increase our immediate capability to relocate the Federal Government. This has been mainly in developing communications.

Mr. THOMAS. You have had a pretty good communications system here with CONELRAD.

Mr. BREWER. Not of the civil defense type. I am talking of interagency communications that would be used by Government agencies relocated and after an attack situation. We have tried to develop these communications around our existing relocation sites.

Mr. MCDERMOTT. I would like to say there is a substantial ongoing effort to develop the best possible plans to insure to the maximum extent possible the preservation of the essential elements of both the executive and the other branches of Government.

Mr. THOMAS. We realize, gentlemen, that there has to be some planning, but we have been planning for 12 years. When will we get the plans completed?

CONTINUITY OF STATE AND LOCAL GOVERNMENT

Mr. BREWER. Sir, I do not know that we will ever get them completed. I hope we will be constantly improving our readiness. We have a list of activities at the State and local level that may be of interest to you, sir. They are shown in this chart.

Continuity of government suggested State legislation—Approvals as of Jan. 1, 1962

States	Constitutional amendment	Chief executive succession	Other executive succession	Legislative succession	Judicial succession	State government relocation	Local government relocation	Local government succession	Records preservation and management
Alabama				[1] X				X	
Alaska		X							
Arizona	X								
Arkansas		X	X	X	X	X	X	X	
California	X	X	X	X		X	X	X	
Colorado									
Connecticut	X								
Delaware	X			X	X	X	X		
Florida		X				X	X	X	
Georgia			X			X		X	
Hawaii						X	X		
Idaho	X	X	X	X	X	X	X	X	
Illinois		X	X			X	X	X	X
Indiana						X	X		
Iowa		X	X	X	X	X	X	X	
Kansas	X	X	X	X	X	X	X	X	
Kentucky									
Louisiana									
Maine	X	X	X	X		X	X	X	
Maryland		X							
Massachusetts									
Michigan	X	X	X				X	X	
Minnesota	X	X		X		X	X		
Mississippi							X		
Missouri	X					X			
Montana		X				X			
Nebraska	X	X	X	X	X	X	X	X	X
Nevada	X								
New Hampshire	X	X	X	X	X	X	X	X	[1] X
New Jersey									
New Mexico	X	X	X	X	X	X	X	X	
New York		X						X	
North Carolina		X	X				X	X	
North Dakota	X	X	X	X	X	X	X	X	X
Ohio	X								
Oklahoma	X	X	X	X	X	X	X	X	X
Oregon	X	X	X	X		X	X	X	[1] X
Pennsylvania	X	X	X	X	X	X	X	X	
Rhode Island	X								
South Carolina	X								
South Dakota	X		X	X		X	X	X	
Tennessee							X	X	
Texas	X	X							
Utah									
Vermont		X	X		X	X		X	
Virginia		X		[1] X					
Washington	X								
West Virginia	X	X	X	X	X			X	X
Wisconsin	X	X	X			X	X	X	
Wyoming		X				[1] X			
Total	27	28	21	19	13	26	25	25	7

[1] Accomplished by constitutional amendment.
[2] Records management only. [3] Records preservation only.

NOTE.—Several States do not require all of these measures.

Mr. THOMAS. Who will carry out all the plans that you are making?

Mr. BREWER. Hopefully, at the State and local level it would be the States and localities themselves. At the Federal level it would be the Government agencies across the board.

Mr. OSTERTAG. As the Chairman pointed out, the military would take over in case of an emergency of this kind.

How do the State and localities administer something that has been taken from them?

Mr. MCDERMOTT. I would not agree with you, sir, that the present plan is that in the event of a serious attack upon this country we are willing to turn over everything to the military.

What our objective is is to preserve the form of government we have and maintain the executive, judicial, and legislative branches.

Mr. THOMAS. What will you do with your 450 or 500 people? Continuity of government is your big program. Do I have to refer back to this table of organization?

Mr. RICE. Actually, Mr. Chairman, our next category is shown on page 25.

Mr. THOMAS. What are you going to do with them?

Mr. RICE. This is the biggest body in terms of number of people. This is the biggest part of our organization.

RESOURCES AND PRODUCTION PLANNING

Mr. THOMAS. This is "Resources and planning." You have 138 positions in 1963.

Mr. RICE. Yes, sir.

Mr. THOMAS. How many did you have in 1960, 1961, and 1962?

Mr. RICE. I do not have the figures for 1960. 1961 was 148, and 1962 was 135.

Mr. THOMAS. Put pages 25 and 26 in the record.

(The pages referred to follow:)

RESOURCES AND PRODUCTION PLANNING

Recapitulation of obligations

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Permanent positions	148	135	138	+3
Full-time equivalent of all other positions	5	4	4	
Average employment	153	136	138	+2
Personnel compensation	$1,497,127	$1,346,000	$1,366,000	+$20,000
Personnel benefits	108,900	97,900	99,300	+1,400
Travel and transportation of persons	67,828	68,500	69,000	+500
Other objects	408,580	352,400	61,600	−290,800
Total	2,082,435	1,864,800	1,595,900	−268,900

GENERAL STATEMENT

This activity develops operating plans to stabilize the economy and manage the national resources under various emergency conditions. Plans are also developed for the restoration and rehabilitation of essential physical facilities after attack. Assistance is furnished to the President in telecommunication management, including assignment of radio frequencies to U.S. Government stations.

DETAIL OF REQUIREMENTS

a. Resources mobilization planning.—Staff assigned to this activity develops plans for the control of resources under a variety of emergency situations; defines the relative responsibilities of Federal, State, and local agencies in resource management; and assures that national resources mobilization plans and readiness measures are in being. It provides guidance on resource mobilization to Federal agencies and the OEP area offices; coordinates policies and programs for the maintenance of essential industrial production facilities; and prescribes standards for their identification, security and restoration. It also coordinates the national defense executive reserve program, insures compatibility of plans and programs to meet long-range human and natural resources, and identifies necessary research for defense mobilization.

b. Mobilization base analysis.—Staff assigned to this function provides for the acquisition of data necessary to mobilization base analysis; coordinates supply-requirements studies of other agencies intended to identify possible deficiencies in the mobilization base; develops plans to reduce or remove expected shortages; determines the impact of expected supply and demand on the national economy and on friendly nations. It develops policies for stockpiling strategic reserves of essential materials and equipment, and plans for their acquisition, storage and disposal; and determines, in cooperation with DOD, Interior, Commerce, Agriculture, State AID and AEC, the need for upgrading or disposing of surplus reserves.

This staff also provides assistance to the Director in preparations for administering the priorities and allocation authorities of title I, Defense Production Act; directs and coordinates studies necessary to assist the Director in administering section 8 of the Trade Agreements Extension Act of 1958; and advises the Department of Agriculture on materials, products or survival items to be acquired for supplemental stockpiles.

c. Economic stabilization.—This staff coordinates plans and programs for the stabilization of the national economy in emergency; insures the existence of preparedness measures to insure the solvency and functioning of the money system; and prepares, or coordinates the preparation of, plans for direct controls on prices, wages and rents, and consumer-rationing programs. It plans for the formation and administration of emergency wartime organizations, where necessary; develops an expanded executive reserve program; and insures the capability of State and local governments to administer appropriate postattack emergency economic programs.

d. Long-range resource analysis and planning.—Staff conducts long-range studies and projections of resource capabilities and deficiencies, in order that our world position may be improved, particularly in relation to the Sino-Soviet bloc. Special attention is given to such common use resources as fuel and transportation.

e. Planning for emergency control of telecommunications resources.—Staff assigned to this activity prepares and maintains readiness plans to insure the flow of essential telecommunication during a national emergency; reviews and updates priorities; and keeps current classified plans for maintaining communications to oversea points. It maintains plans and standby actions for an emergency communications agency in a condition ready for operational use; and encourages the telecommunications industry to maintain an appropriate state of readiness.

f. Management of telecommunications.—Under this activity, advice and assistance is provided to the President with respect to assignment of radio frequencies to Government radio stations. Policies and procedures governing use of these frequencies are developed and aid is given to the Federal agencies with technical radio allocation and assignment problems associated with the agencies' requirements. Coordination of the development of an executive branch position with respect to the projected International Conference on Space Telecommunications will be completed. Also in the international field is a program for coordination of United States and Canadian frequency assignments in the border zone, within specified bands.

Due to the rapidly accelerating demand for frequencies and the revolutionary changes in communication techniques and systems, continuous planning is necessary in order to assure the maintenance of high standards. Of special importance is long-range planning and OEP is collaborating with the Federal Communications Commission in this area.

Mr. THOMAS. What are these people going to do?

Mr. BELSEY. Mr. Chairman, these are the people engaged in the problems of management of resources. This includes not only the stabilization of the economy, but it includes all other resources—manpower, transportation, fuel and energy, production, the strength of our mobilization base. This is their general effort.

Mr. THOMAS. Here is wage control, price control.

Mr. BELSEY. That is merely on the economic stabilization side. It does include that, but not that alone.

Mr. THOMAS. That is a part of this?
Mr. BELSEY. That is right.
Mr. THOMAS. Break this down into activities, with personnel.

RESOURCES AND PRODUCTION PLANNING EMPLOYMENT

Mr. BELSEY. There are 89 presently contemplated for this area, of which 5 will be in the Division Director's Office.
Mr. THOMAS. For research and development?
Mr. BELSEY. No; resources, planning, and mobilization.
Mr. THOMAS. How many categories are here?
Mr. BELSEY. There are 104 positions at the moment for the Resources, Planning, and Mobilization Division. That is, this past fiscal year. We contemplate 89 for next fiscal year. These figures do not include the telecommunication activities under Dr. Stewart's supervision.
Mr. RICE. Telecommunications is also under this budget category. That adds up to 49 for next year.
Mr. BELSEY. There are five in the Office of the Director of the Division. There are nine in the Economic Stabilization Branch.

ECONOMIC STABILIZATION

Mr. THOMAS. Economic Stabilization. What are their jobs?
Mr. BELSEY. Of those nine, five are professional and four are clerical.
Mr. THOMAS. What are their duties?
Mr. BELSEY. Their activities deal with the problems of economic stabilization such as wage, price, and rent control, consumer rationing, the monetary system, and the credit system in an emergency and after an attack.
Mr. THOMAS. How many people are there in the Department of Commerce now doing that same job?
Mr. BELSEY. On that activity, so far as I am aware none. Their activity is quite different.
Mr. THOMAS. How different is it?
Mr. BELSEY. Their activity is in the production and materials allocation area—the production of items, not the stabilization of the economy. They have nothing whatever to do with emergency monetary matters and economic stabilization.
Mr. THOMAS. Do they not have a study group doing the same thing in BDSA?
Mr. BELSEY. Not that I am aware of. They are not doing this.
Mr. THOMAS. You are sure?
Mr. BELSEY. We are talking about economic stabilization.
Mr. THOMAS. That is wage control and price control?
Mr. BELSEY. Also rent control, consumer rationing, and emergency monetary and credit problems.
Mr. THOMAS. What is this crowd doing in 1963 that they did not do in 1961 and 1962?
Mr. BELSEY. The effort in 1963 is to develop this so that it can be carried out at the State and local level.
Mr. THOMAS. What were they doing in 1961 and 1962?

ENCOURAGEMENT OF STATE AND LOCAL EFFORTS

Mr. BELSEY. The primary effort before has been in trying to develop capability and the plans to do this at the national level. Now the effort is to carry this to the States and localities, to develop a capability on their behalf to do this in the interim period until such time as the overall national arrangements can be reconstituted after an attack. This means carrying it to every State and down to the localities.

Mr. THOMAS. What is the difference between breaking it down between the States and the National Government on price control?

You will have a price control with one set of figures and a wage control in one area and not in the other. Will you invoke it in some areas and not in another?

Mr. BELSEY. We assume it will be invoked in all.

Mr. THOMAS. Who is going to do the invoking?

Mr. BELSEY. We assume that this will be invoked at the national level as a matter of policy, but that it will have to be carried out at the State and local level at the beginning because we also assume the Federal Government will have no capability to do so at the outset.

Mr. THOMAS. Do you think any plans you make now will satisfy the particular States?

Mr. BELSEY. We hope so and we think they will. As a matter of fact, a series of meetings have already been held at the regional level that have been attended by State and local representatives.

Mr. THOMAS. You have accounted for how many of your people? Is it 89?

Tell us about the other ones.

MOBILIZATION BASE ANALYSIS BRANCH

Mr. BELSEY. Of the total, 42 in the past year have been in the Mobilization Base Analysis Branch. This includes the whole strengthening of our mobilization base, establishment of plans for it, and it includes the establishment of policies with respect to the stockpile.

Mr. THOMAS. What categories do you have under "Resources and production planning"?

Mr. BELSEY. On page 25 and at the top of page 26.

Mr. RICE. That accounts for the total of 89 positions.

Mr. THOMAS. Where is the remainder?

Mr. BELSEY. The remainder of the 104 for the past year involves 30 in the Mobilization——

Mr. THOMAS. You have 135 set out for 1962.

Mr. BELSEY. That includes telecommunications, which totals to 44 in the past year and contemplates 49 next year. The 89 figure does not include telecommunications.

The total then—30 were in the Mobilization Plans Branch and there were a total of 9 in the resources advisory staff.

Mr. THOMAS. What will mobilization planning do?

You say "Research has been neglected in this field for years." That is certainly a bad admission. That is an admission against interest.

For 12 years we have been doing this. Now things have been neglected. It is $775,000 this year.

What did you have last year and how many personnel do you have in here for this year?

Mr. McDERMOTT. That is in a different category, sir. Do you wish to move to that and pass telecommunications now?

TELECOMMUNICATIONS

Telecommunications, sir, is included in "Resources and production planning." It is covered on page 26 and contemplates 49 people. That is Dr. Stewart's organization.

Mr. THOMAS. How many did you have last year?

Mr. McDERMOTT. There were 44 last year.

Mr. THOMAS. How many will he have this year?

Mr. McDERMOTT. There will be 49 in fiscal year 1963. We expect five more people as a result of expanded responsibilities under the Executive order.

Mr. THOMAS. What will they do that they have not been doing heretofore?

Mr. McDERMOTT. Perhaps we should let Dr. Stewart speak to that.

Mr. STEWART. In a sense I am the ghost at this table, since I am not in being. My nomination is before the Senate Commerce Committee and the hearing is to be held Tuesday of next week. I have not been in office.

Mr. THOMAS. We will confirm you now, Doctor, so you go ahead.

Mr. STEWART. If I had been in office, I probably would have asked for 10 instead of the 5 allocated.

I think the main thing about this office is, its continuing nonemergency nature, trying to bring a more efficient use of telecommunications on the Government side—not the non-Government but just the Government side.

Mr. THOMAS. Do you handle the military too?

Mr. STEWART. Yes. That will be a part of the function.

Mr. THOMAS. Let us put these paragraphs at the bottom of page 26 and top of page 27 in the record.

Under this activity, advice and assistance is provided to the President with respect to assignment of radio frequencies to Government radio stations. Policies and procedures governing use of these frequencies are developed and aid is given to the Federal agencies with technical radio allocation and assignment problems associated with the agencies' requirements. Coordination of the development of an executive branch position with respect to the projected international conference on space telecommunication will be completed. Also in the international field is a program for coordination of United States and Canadian frequency assignments in the border zone, within specified bands.

Due to the rapidly accelerating demand for frequencies and the revolutionary changes in communication techniques and systems, continuous planning is necessary in order to assure the maintenance of high standards. Of special importance is long-range planning and OEP is collaborating with the Federal Communications Commission in this area.

What does all that mean now?

Mr. STEWART. I had not seen this particular statement, Mr. Chairman.

SCOPE OF TELECOMMUNICATIONS PROGRAM

Mr. THOMAS. You tell us exactly what it means. How many employees are you estimating this year against next year?

Mr. STEWART. I have no detailed information, Mr. Chairman, about what any employees are doing, because I am not yet on the job.

Mr. THOMAS. You do not know what the organization will do this year that they have not been doing through the years? You have had this same agency, have you not?

Mr. STEWART. No, on this level it has not existed.

Mr. THOMAS. What level did you have in 1960, 1961, and 1962?

Mr. STEWART. It has been at a level in which the Government users of telecommunication frequencies have dealt with each other without too much supervision from above, in an attempt to provide a national pattern.

Mr. THOMAS. You are going to cover the military, too, are you not?

Mr. STEWART. It is the entire Government area; yes, sir.

Mr. THOMAS. Civilian and military, as far as Government is concerned?

Mr. STEWART. That is correct.

Mr. THOMAS. How are you and General Services going to fit into this program? General Services are going to develop a telecommunications system for all civilian agencies.

Mr. STEWART. Ours will be a program—perhaps I can use this word again—a planning program, trying to foresee the future. Theirs will be an actual working arrangement, as I understand it.

Mr. THOMAS. If they are making it work now, what is the use of your doing some planning? Where does the planning come in if they are making it work now?

Mr. STEWART. This is an area in which science is moving rather rapidly, and we hope to get some planning ahead of the time that the practical possibilities are on us.

COOPERATION WITH FCC

Mr. THOMAS. What part will the Federal Communications Commission play in this picture?

Mr. STEWART. There will be a closely cooperative relationship between this office and the FCC on the non-Government side. I think that will be a very cordial relationship.

Mr. THOMAS. You said if you had made out this budget it would have provided for 10 more positions than actually requested. What would you have done with them, Doctor?

Mr. STEWART. I think what is needed is very high caliber individuals who know as much about communications as anybody in other Government agencies knows. The carrying out of agency programs is their function, but this office should have persons who are as well qualified as anybody in Defense or anybody else.

Mr. THOMAS. We agree to that. You have 49 of them now. I assume they are qualified, but what are they doing?

GOVERNMENT FREQUENCY ASSIGNMENTS

Mr. STEWART. The people who are on the staff now are keeping track of the thousands and thousands of assignment of frequencies to Government use at the present time.

Mr. THOMAS. Is not the Federal Communications Commission doing that?

Mr. STEWART. Not for Government. Theirs are non-Government. It is my understanding that the Government frequencies have not been critically reviewed to see if they are being used in the most efficient fashion. I think that is one of the things which must be done.

Mr. THOMAS. You have a certain part of the entire spectrum set out for Government use, and the remainder of it is set out for civilian use. A part of the Government's use is set out for military. The present organization, the Federal Communications Commission and the military, have quite a few meetings. One or the other is trying to get a few more bands. That is about it, is it not?

Mr. STEWART. If that were all there is to it, Mr. Chairman, I think I would still be in West Virginia teaching school.

Mr. THOMAS. What more is there to it?

Mr. STEWART. Trying to get this set up in a way which will make a more efficient use of a rapidly diminishing natural resource.

Mr. THOMAS. What do you mean by "diminishing"?

Mr. STEWART. Diminishing in the sense that as more and more potential users of telecommunications come in and want more and more frequencies, somebody has got to say finally, "Boys, you have reached the bottom of the barrel, and you must make more efficient use of what you have and what is left." This is the big element that has been missing, as I understand it.

Mr. THOMAS. If you get that controversy between UHF and VFH settled, that will help out a lot, will it not?

Mr. STEWART. That is one of the FCC problems, I believe. I have no desire to try to take that off their hands.

Mr. THOMAS. I can well imagine you are right. They would like to give it to you, would they not?

RELATIONSHIPS WITH FFC

Mr. STEWART. On the relationship with the FCC, Mr. Chairman, let me just say that Commissioner Minow and Commissioner Bartley are two people who were instrumental in trying to get me to come here, so evidently they feel something is needed.

Mr. THOMAS. I bet you do an awfully good job.

Mr. STEWART. Thank you, sir. I will try.

Mr. MCDERMOTT. For your information, Mr. Chairman, 7,895 applications were received last year in the telecommunications section for radiofrequency assignments.

Mr. EVINS. This is in the Government?

Mr. MCDERMOTT. Yes.

Mr. OSTERTAG. Civil defense?

Mr. MCDERMOTT. No, this is all Government requests for frequency assignments. In fiscal year 1963, it is estimated there will be 8,500 requests.

Research and Development

Mr. Thomas. What about your research and development now. You are requesting $1,500,000 in your budget for 1963. You want that to be no-year funds. Why?

Mr. Stokley. Why do we wish it to be no-year funds, or why do we need the $1.5 million?

Mr. McDermott. Both.

Mr. Stokley. We need the no-year funds primarily because the time of entering into these contracts sometimes is difficult to predict. The work which we do under this cannot always be completed as rapidly as we would like. We feel it is better economy from the standpoint of the Government to have a carryover.

Mr. Thomas. How are you going to spend this money? You set out research to support national security policy $200,000; research to support continuity of government, $150,000; research to support mobilization planning, $775,000; research to support national leadership and evaluation, $200,000; research to support telecommunications planning, $175,000.

Insert pages 31 through 35.

(The pages referred to follow:)

Research and Development

Obligations

1961 actual	$5,720,210
1962 estimate	843,289
1963 estimate	1,500,000
1963–1962 difference	+$656,711

General Statement

The Office of Emergency Planning develops plans and programs (1) for the effective use of our economic strength and resources in the worldwide competition with international communism, (2) for the mobilization and effective use of our resources in the event of small or large limited wars, and (3) for the survival and reconstruction of our Government and economic systems in the event of possible nuclear attack.

Although emphasis is devoted to the unprecedented problems which would face the Nation in the event of nuclear war, it is increasingly clear that the security of the Nation may be jeopardized by Communist subversion of weaker nations in Asia, Africa, and Latin America. Communist takeover in any country is always accompanied by a loss of resources available to the free world, and by complicated changes in international trade. Communist subversion is almost always accompanied in its later stages by the use of military force in guerrilla actions of mounting intensity, and it has already been recognized as part of the grand strategy for the national defense that direct military involvement of the U.S. forces on a significant scale may be required in preference to piecemeal surrender or nuclear war. Any such involvement places added requirements on the Nation's resource base.

The problem of reconstruction following nuclear war has received little serious research attention. It is not possible to predict the precise nature of any enemy attack, given the wide ranges of strategic and tactical choice open to an aggressor, but much can be done to evaluate the extremes of damage and to assist in the development of feasible programs to meet these contingencies.

All of these problems have the following common element: (1) they involve the relationship between the national security and the economic and resource base of the Nation and the free world, which is the primary concern of OEP; (2) they have little historical precedent as a guide for action; (3) they are complex economic-political problems which often require new techniques for

analysis, often involving large quantities of data and complicated electronic computer systems. These are tasks which are most efficiently performed where it is possible to supplement the knowledge of OEP and Federal agency staff with the special expertise provided on an intermittent basis to work on carefully defined tasks. This can only be done through research contract, which is provided for in this estimate.

The research areas described below are grouped under five major headings: (1) national security policy; (2) continuity of government; (3) mobilization preparations; (4) national leadership and evaluation; and (5) telecommunications. All of these provide for continuation and extension of work currently in process, both in the agency and through research contracts. Since it is desirable to contract on a project rather than a time basis, it is requested that funds be provided without fiscal year limitation.

DETAIL OF REQUIREMENTS

a. Research to support national security policy, $200,000

Since emergency planning is the responsibility of many agencies of Government, it must have common central assumptions regarding the various contingencies for which plans must be developed. The research proposed would (1) select a number of possible emergency situations sufficient to cover the range of probabilities, (2) define the probable course and outcome of each, and (3) describe in detail (for each) the resultant problems and environment, including condition of the people, resources, and economic and political institutions of the Nation. Where available, the work will be based on research findings of other Government agencies and private groups.

b. Research to support continuity of government, $150,000

This research is intended to provide an intensive analysis of political and economic institutions and systems under typical protracted tension, large-scale conventional mobilization, and postattack situations, so that vulnerabilities can be identified. Studies of executive leadership, decisionmakng, and executve processes are available, but few of these relate specifically to the exigencies of nuclar war or its anticipation. The development of methods for interrelating analyses of political, economic, and social vulnerabilities and the development of practical plans to counter these vulnerabilities, are essential elements of this research.

In this category, it is also planned to complete an analysis of State legislation to determine what new legislation is needed in an emergency. Work in fiscal years 1961 and 1962 covered 30 States, and the remaining 20 will be completed in fiscal year 1963.

c. Research to support mobilization planning, $775,000

Research to support mobilization planning has been neglected in recent years. The demands of civil defense research have been accorded priority. As a result, we have failed to take full advantage of possible new techniques and systems to cope with the increasing complexity of the resource management problems which would arise under the various contingencies for which we must plan. More than half of the proposed research program for fiscal year 1963 is devoted to remedying this deficiency.

An important part of this research effort will be directed toward the development of more efficient systems for estimating requirements, not merely in terms of end products, but including the requirements for producing, transporting, and distributing truly essential consumer goods and supporting military requirements. A particularly complex part of the job is that involving interindustry requirement factors. Full advantage will be taken of the facilities of the OEP's National Resource Evaluation Center and of the related work of the Office of Business Economics of the Department of Commerce, the Bureau of Labor Statistics of the Department of Labor, and of other governmental agencies.

A companion piece to the above will be the improvement or development of systems for estimating the availability of supplies and the emergency capacity of various producing systems. This will involve the development of improved inventory techniques to permit more rapid and therefore, more current inventories of quantities and geographic distribution of essential items. Also involved will be the development of improved information on the vulnerability of resource inventories and of methods for the rapid analysis of the capability of

transportation, communication, and power networks to meet the demands of emergency situations.

In addition, research will be continued on the development of a dynamic inter-industry model of the U.S. economy for use in the OEP National Resource Evaluation Center to produce estimates of available supplies and compare them to stipulated requirements in a variety of situations.

Other studies will be directed toward the discovery of particularly vulnerable parts of the economy.

d. Research to support national leadership and evaluation, $200,000

This research will provide for two semiannual surveys of public knowledge and attitudes. Such surveys, conducted on a comprehensive and systematic basis, are required to provide data on the extent of public knowledge in national security affairs, for public information policy. It will also defray the costs of the secretariat of the National Academy of Sciences-National Research Council Advisory Committee on Behavioral Science, and other expenses of committee members who serve without compensation. The committee brings together outstanding members of the academic and government community and provides a basis for exchange of information, stimulation of research in universities, and advice to OEP on its public information responsibilities.

e. Research to support telecommunications planning, $175,000

Research in this area will be represented by the following projects, which are the outgrowth of prior work:

(1) *Technological studies.*—As Federal Government uses of the radio spectrum continue to increase in support of programs for the national defense, safety of life and property, space exploration, and other activities essential to the national interest, congestion in the spectrum and harmful interference among radio transmissions present a growing program to those responsible for management of the use of the spectrum resource. Continued improvement in frequency usage and long-range planning for use of bands of frequencies is mandatory if orderly procedures are to continue in the United States usage of the radio spectrum. Attainment of additional know-how in the form of automation techniques requires research into scientific and technical bases of radio communication as well as into spectrum management processes. Broad scientific and technical areas which must be explored include radio wave propagation factors, technical standards and equipment design factors which influence efficiency in the use of the spectrum, and more extensive and intensive application of the information-communication theory to the practical radio art. An amount of $75,000 has been included for this project.

(2) *Electronic computer application.*—The continuing increase in requirements and workload indicate that present methods of manual selection of specific frequencies, committee consideration and assignment, and IBM machine record-keeping within the executive branch may become overtaxed in the foreseeable future. Approximately 2,200 frequency actions per month are being handled at the present time, and this number is expected to increase to about 3,600 per month 5 years hence. The present manual procedure, with engineering appraisal of each selection by each agency involved, is a time-consuming process. Application of electronic computer techniques at a central location, where all necessary data could be available and kept current, would largely eliminate the need for individual computations. Such application should lead to faster satisfaction of radio frequency requirements, more uniform application of criteria for satisfactory communication and avoidance of harmful interference, more effective use of the radio spectrum, and probably less manpower and funds for the future prosecution of the activity. The estimate includes $100,000 for this project.

RESEARCH PROGRAMS

Mr. STOKLEY. Would you like to go through these, one by one, and talk a little bit about what is in them? To do a complete job, I would have to give you a 9-page statement which lists all of these research projects which have been undertaken.

Mr. THOMAS. How much research money did you have last year?

Mr. STOKLEY. Last year, related to the OEP programs on a comparable basis, we had $1,206,000.

Mr. THOMAS. For what?

Mr. STOKLEY. One project, for $50,000, in the category of "Research in support of national security policy," was a participation with the Army in a joint study of the continental defense problem and civil defense problem in the 1965–75 time period.

Mr. THOMAS. You have had research projects going, of 15 or 20 people, on human behavior under stress, and a half dozen others. What are you going to research on this year which you have not been researching on in past years?

Mr. STOKLEY. I would like to say we had all the answers in this field, but there are a great many remaining.

MOBILIZATION PLANNING RESEARCH

Mr. THOMAS. The big item is "Research to support mobilization planning."

Research to support mobilization planning has been neglected in recent years. The demands of civil defense research have been accorded priority. As a result, we have failed to take full advantage of the possible new techniques and systems to cope with the increasing complexity of the resource management problems—

and so forth.

With whom are you going to spend this money, and what do you expect to get out of it?

Mr. STOKLEY. This research to support mobilization planning is, of course, central to the whole OEP problem. This is the economic side of the total security problem.

Mr. THOMAS. With whom are you going to spend this money?

Mr. STOKLEY. We are going to spend it with a number of contractors.

Mr. RICE. Seventeen projects.

Mr. STOKLEY. Approximately 17. The Stanford Research Institute is one. The National Planning Association is another.

Mr. THOMAS. How much are you spending with the Stanford Institute, and where is it located?

Mr. STOKLEY. Stanford is out at Palo Alto, Calif.

Mr. THOMAS. How much?

Mr. RICE. For fiscal 1963, $200,000 for one project——

Mr. STOKLEY. We have not actually broken down for sure.

Mr. THOMAS. What are they to do research on?

Mr. STOKLEY. This provides a good example, I think, of what we are trying to do in research. We are not trying to do broad spectrum original research in the national security area. We are trying to adapt military studies for the nonmilitary program, because the nonmilitary program with which we are concerned always follows the results of the military technology and military developments.

Mr. OSTERTAG. You are taking the research and researching it, is that it?

Mr. STOKLEY. No, sir, we are taking research which has defined the military problem, and from that we are more carefully defining our own problem as a basis for providing guidance to the other Federal

agencies and for developing the kind of mobilization plans which are needed to cope with this.

RESEARCH EXPENDITURES

Mr. OSTERTAG. Mr. Chairman, I want to clear up the general funds with regard to research in the past.

According to your justifications here, you had $5.72 million in 1961. Those are no-year funds, are they not?

Mr. STOKLEY. Yes, sir.

Mr. OSTERTAG. They have been carried over into 1962. I believe some of that was for the fallout shelter study, was it not?

Mr. STOKLEY. Yes, sir.

Mr. OSTERTAG. Is any part of that being used now for your program?

Mr. RICE. We had no prototype shelter funds in OEP for 1962. We did have a small carryover, but all prototype shelter funds were transferred to Defense.

Mr. OSTERTAG. You had $1,206,000 last year, according to your statement, Mr. Stokley. Yet the estimate is $843,000.

Mr. STOKLEY. I was speaking of 1961. I am sorry.

Mr. RICE. It is $843,000 for the current year.

Mr. OSTERTAG. For 1962?

Mr. RICE. Yes, sir.

Mr. OSTERTAG. What is the $1,206,000 for 1961?

Mr. RICE. That is the OEP portion of the $5 million that was obligated in 1961.

Mr. OSTERTAG. Have any of these funds been transferred to the Defense Department?

Mr. STOKLEY. Yes.

Mr. RICE. They got the rest of it.

Mr. WALL. Of the $5.7 million obligated, $1.2 million is related to OEP projects. We did not transfer in the estimates the civil defense obligations for research. In other words, we picked up all 1961 obligations which had CD and OEP projects in them, the $5.7 million.

Mr. THOMAS. Your transfers were covered over to DOD.

POSTATTACK PLANNING

Mr. THOMAS. Mr. Reporter, put pages 37, 38, and 39 in the record. (The pages referred to follow:)

Summary of obligations by activities

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Postattack planning (total obligations object class 25)			$3,000,000	+$3,000,000
New obligational authority (appropriation)			3,000,000	+3,000,000

Postattack Planning

(1963 estimate, $3 million)

GENERAL STATEMENT

The advent of nuclear weapons has imposed new requirements in national emergency planning. Whereas in previous war emergencies the Federal Government exercised any necessary functions related to management of natural and industrial resources and stabilization of the economy, it is now possible that Federal direction may be impossible for an extended period following a possible nuclear attack. State and local governments must, therefore, be prepared if necessary to manage their own resources and economies until Federal direction and control can be established. They must also, of course, be prepared to play their part in a national system thereafter. This responsibility requires, among other things, the development of detailed plans for the imposition of price, wage and rent controls which can be put into effect if needed.

This estimate will finance economic and resource surveys at the State and local levels, to assist State and local governments in developing this capability. Under present world conditions, it is essential that this be undertaken at the earliest possible date, since the survival and recovery of the Nation might depend upon the ability of States and local communities to conserve, control, and direct the allocation of resources to save lives, support national military requirements, and to rebuild the Nation.

This program will be governed by stringent standards. The Office of Emergency Planning will require that project proposals and contractual arrangements with States incorporate these provisions:

(*a*) Final plans must be consistent with national policies.

(*b*) Work must proceed in accordance with detailed guidance materials to be furnished by OEP.

(*c*) Project contracts will require separate studies in specified economic and resource areas to be conducted by qualified personnel.

(*d*) Participants must agree to make full use of the technical staffs and other personnel of appropriate agencies of State and local governments. Available data, materials, facilities, and equipment may be considered as a part of the State and local contribution to the project, but salaries of regularly employed full-time State and local government personnel will not be reimbursed except where such personnel may be detailed to work on the project on a full-time basis for 30 consecutive days or longer.

(*e*) State and local governments will be required to keep emergency planning current and up to date after the project is completed, and to submit plans for periodic review or testing.

(*f*) State and local governments will be required to submit quarterly reports on progress to the OEP and a final written report covering actual emergency plans adopted for each economic and resource area.

(*g*) All projects must take into account and be fully coordinated with other emergency plans adopted by State and local governments.

The amounts needed to carry out this program will vary depending upon several factors, including:

(*a*) Amount of useful resource planning information available;

(*b*) Extent of previous planning and organizational work;

(*c*) Unusual problems pertinent to the particular jurisdiction; and

(*d*) Amount of personnel and other administrative help and facilities which the States can provide.

The estimates range from $25,000 to $300,000 for the States and from $10,000 to $100,000 for local geographic areas. In fiscal year 1963, 15 States and 30 local geographic areas would be studied with the $3 million requested.

DETAIL OF REQUIREMENTS

The type of economic and resource management study that States and many local geographic areas will be asked to undertake in this program will require a well-organized and carefully directed planning effort over a period of many months. The actual emergency or action plans which each State and local planning group will be required to develop and implement will necessitate an analysis of the entire resources structure of the State or community. They will

need to inventory and catalog their sources of resource strength and trained manpower; to calculate minimum resource requirements for their local populations and industries for varying periods following a nuclear attack; to compute the kind, proportions and destinations of locally produced resources which traditionally move outside their borders, and those resources which are traditionally imported into the State to supply local deficiencies. They will require a thorough knowledge of their transportation complex and the intricacies of the operations of the financial community. State and local planning groups will have to involve the whole body of expertise in public and private life who have intimate knowledge of the economic and resources picture in order to identify the potential sources of economic and resource problems that would prevail in an attack situation. Separate task groups working with each economic and resource area will need to apply available resource data to actual attack assumptions in order to develop workable emergency plans.

In the event of a nuclear attack, the Federal Government would need to exercise control of the economy and management of resources in all areas where it was able to function. It is essential in this program that all State and local planning efforts and the plans that are developed be consistent with each other, as well as fully compatible with national policies and plans. It is particularly important that State and local emergency resource management take into account not only the local survival operations but the overriding national interest. As soon as possible after an attack, State and local economic and resource control in all areas of the country would be assumed by the Federal Government. State and local plans must permit orderly transition from State and local control to Federal control, and State participation thereafter.

SUMMARY OF POSTATTACK PLANNING

Mr. THOMAS. This is postattack planning.

The estimate will finance economic and resource surveys at the State and local levels to assist State and local governments in developing this capability. Under present world conditions, it is essential that this be undertaken at the earliest possible date * * *.

This program will be governed by stringent standards. The Office of Emergency Planning will require that project proposals and contractual arrangements with States incorporate these provisions:

(*a*) Final plans must be consistent with national policies.

(*b*) Work must proceed in accordance with detailed guidance materials to be furnished by OEP.

But down at the bottom, I notice:

(*d*) Participants must agree to make full use of the technical staffs and other personnel of appropriate agencies of State and local governments. Available data, materials, facilities, and equipment may be considered as a part of the State and local contribution to the project, but salaries of regularly employed full-time State and local government personnel will not be reimbursed except where such personnel may be detailed to work on the project on a full-time basis for 30 consecutive days or longer.

The question I raise here is, What part of this $3 million will be paid for salaries on the Federal level and on the local level?

I have a note here to see the middle of page 39, which reads:

TOTAL COST OF STUDIES

The estimates range from $25,000 to $300,000 for the States and from $10,000 to $100,000 for local geographic areas. In fiscal year 1963, 15 States and 30 local geographic areas would be studied with the $3 million requested.

What will this project cost to complete?

You go on to say you are going to break this down, not only at the State level, but finally you will go into every county seat or at least

the big cities. What will this program cost to finish it? You are dealing with only 15 States.

Mr. McDermott. It is envisioned, sir, as a 3-year program with a total maximum expenditure of $10 million, $3 million of which would be obligated in the first year. There are substantial details of the program that have been developed, which you might be interested in having submitted to you. Mr. Brewton is prepared to give you further detail on that as you may wish. Would you speak briefly to that?

Mr. Thomas. Have we not been studying this proposition of State assets and State resources for about 10 years?

Mr. Brewton. Mr. Chairman and members of the committee, we have been studying resource management techniques for quite a number of years.

Mr. Thomas. How many jobs are involved in this, and where are they located?

Mr. Brewton. All of the jobs which are involved in the $3 million are non-Federal jobs. None of the $3 million is calculated to pay any Federal salaries.

Mr. Thomas. How will it be spent, then?

Mr. Brewton. Mr. Chairman, if I may try to clarify, I think, an ambiguous point or two which has arisen in the consideration of this item, let me refer to the thesis of this State and local capability which is sought to be developed. There is increased emphasis upon the development of readiness plans at the Federal level. I think we all realize that the job at the Federal level in various resources has not yielded the product that it must in the light of the situation today.

USE OF STATE AND LOCAL RESOURCES

Since we can no longer rely solely upon the traditional management by the Federal Government in the case of nuclear attack and fragmentation of this country, with possibly isolated areas, we must draw to a larger and larger degree upon the resources of the States and local communities.

In order to bring about State and local capability somewhat comparable to the capability reposing in the Federal Government, we are seeking to have the States inaugurate a comprehensive plan which involves two parts: (1) the legal base for resource management and economic stabilization, that is, comprising continuity of government——

Mr. Thomas. Mr. Brewton, you have had 2,500 State employees working on the State level for many years. Up until 1961, you had 2,500. For the fiscal years 1961 and 1962, you have had 3,900 or 4,000. What are those 4,000 people to do now which they have not been doing heretofore?

Mr. Brewton. Mr. Chairman, if I understand correctly the history of this organization and its predecessor, OCDM, and understand what has been involved with those State and local employees, it is my impression during the months that I have been on this job that most of those employees have been devoting their efforts to survival operations, civil defense operations. A relatively small percentage of those employees have been concerned with resources.

It is my impression that in those instances where attention has been given to resource management and resource availability——

(Off the record.)

Mr. THOMAS. Every big city or every city from 25,000 up has a detailed catalog, and they will tell you what they have right down to last Saturday night. They already have it cataloged, and it is part of their money-raising program every year to tell the people in the area what they have, what their natural resources are, and what they are doing. So that information is already available in the cities and towns of the country.

Mr. BREWTON. Mr. Chairman, that information will be extremely important to these local resource planning groups.

COOPERATION WITH DOD IN POSTATTACK PLANNING

Mr. OSTERTAG. You have an estimate of $3 million for postattack planning. That is the subject under discussion. I am wondering where the difference lies as betwen this request and budget requests of the Defense Department for a somewhat similar program. They have a request for $3,255,000. The program covers planning, supervising, controlling, executing all research efforts in support of civil defense operating functions in the postattack period, and so on.

Is there a difference between your responsibilities and your program, and those of the Defense Department under this postattack planning? I think it should be cleared, because they are coming along with a justification for their money.

Mr. MCDERMOTT. That is a perfectly proper inquiry. The separation of these responsibilities is an area which has received the close attention of both Assistant Secretary Pittman of OCD and myself. As I believe he will tell you when he comes before you, we are cooperating in this effort. We are avoiding any duplication of planning activities. This program takes off with the States where, by agreement between Mr. Pittman and ourselves, Civil Defense responsibilities have terminated. There is, in fact, no duplication here.

PRESENT AVAILABILITY OF LOCAL RESOURCE INFORMATION

Mr. THOMAS. Let me read this language:

> They will need to inventory and catalog their sources of resource strength and trained manpower; to calculate minimum resource requirements for their local populations and industries for varying periods following a nuclear attack; to compute the kind, proportions and designations of locally produced resources which traditionally move outside their borders, and those resources which are traditionally imported into the State to supply local deficiencies.

That summarizes in a nutshell. I submit you can go into any industrial town of 25,000 and above, and you will have all the information you need. For the use and benefit of the local community, it is already there. The chamber of commerce has it and your business organizations have it. So, why do this?

Mr. BREWTON. Mr. Chairman, those business organizations and chambers of commerce would be sources of information. There is also a wealth of information reposing in various Federal agencies, as you so well know. But information gathering is not the whole objective which we are seeking.

Mr. THOMAS. For whom are you gathering this, Mr. Brewton—for the use and benefit of the Federal Government or the local communities?

Mr. BREWTON. Primarily for the use and benefit of the local communities, and, secondly, for the benefit of the Federal Government.

Mr. THOMAS. If it is for the use and benefit of local communities, the local communities already have it. They have it by county and by city. So it is already there and tabulated.

Mr. BREWTON. It has been our observation, sir, if I may respectfully say so——

Mr. THOMAS. You may say anything in the world you want to. Do not let that worry you.

Mr. BREWTON. Yes, sir. Incidentally, I do not come as a stranger to the Congress. It was my privilege for about 18 years to be administrative assistant to Senator Hill of Alabama, and also to serve under the junior Senator from Alabama, Senator Sparkman, as general counsel of the Senate Small Business Committee. Senator Hill, as you know, is a member of the corresponding subcommittee on the Senate side. I have great admiration for each of you and for your devotion to work.

Mr. THOMAS. Let us put it like that. We all admire the Senators.

Mr. BREWTON. Thank you, sir.

If we can conceive that a State, like the great State of Texas, was once an independent republic and had to go it alone in those days——

Mr. EVINS. He is going to get close to you yet.

ROLE OF FEDERAL AND STATE GOVERNMENT IN POSTATTACK SITUATION

Mr. BREWTON. It might have to go it alone again. Suppose it was in a cutoff situation. We did not know how much of the balance of the Nation was left intact. Communications are all down. Obviously, the people of the Lone Star State under such a situation would look to their chief executive for guidance under a situation of distress and terror. The chief executive must have some sort of sophisticated, knowledgeable organization in a standby status to function, if he has to, until the Federal Government can assume its traditional role of management.

We are seeking, Mr. Chairman and members of the committee, to bring together into one place, through a Resource Management Committee, headed by an Emergency Planning Director, all the pertinent information which would be necessary to husband resources and maintain the economy, looking toward the reconstitution of the Nation, the whole United States.

Much information reposes in many places. Certainly your State of Texas Railroad Commission, having jurisdiction over railroads and oil lands, has a wealth of information. But I doubt very much that all the information that exists in the State of Texas or in any other State—New York, for example—has been related to positive, affirmative plans and related to people who have sufficient knowledge of those plans, and what they should do with them, to make the best use of them.

I like to think of this program actually as one designed primarily to stockpile knowledgeable people in procedures that would be needed in the worst eventuality imaginable.

Mr. THOMAS. If you are going to stockpile people, you have been doing that pretty well. You had 4,000 and are seeking more.

DISTINCTION BETWEEN OEP AND DOD PROGRAMS

Mr. OSTERTAG. Mr. Chairman, I did not obtain a complete answer to the question with regard to the need of two programs, one by the Defense Department and one by OEP, in this postattack planning research and development. The Director, I believe, was qualifying it, but I do not believe it was completed.

Mr. MCDERMOTT. That is correct.

With further reference to that, this program relates solely to recovery and rehabilitation postattack. It does not include any phase of any civil defense program capability development which may be necessary at State and local levels. I believe you will find when the Office of Civil Defense comes before you that their planning program has to do solely with civil defense and survival of people types of activities. This OEP program relates to the postattack period when we are endeavoring to preserve as much of our economy as possible in terms of productivity and to rehabilitate the economy after an attack. We feel that capability must be created at State level.

If the two organizations were again merged, if civil defense and resource management responsibilities now in OEP were again merged, these two programs would flow into each other.

Mr. OSTERTAG. I thought the description you had been giving came under Mr. Belsley's direction; namely, Resources Planning and Mobilization Division.

Mr. MCDERMOTT. It has to do clearly with resource mobilization and planning, but as a program it is set up separately and it is being developed under Mr. Brewton's immediate direction and guidance. It addresses itself to creating this capability at State and local levels to deal with the economic problems of postattack.

Mr. THOMAS. Summarizing your answer to Mr. Ostertag's question, you say there is no duplication between the program of OEP and OCDM. OCD will deal with human resources, physical bodies, and you are dealing with the economic assets of the country, excluding humanity. Is that it?

Mr. MCDERMOTT. That is partially correct, sir.

Mr. OSTERTAG. Would you say their part deals with food, supplies, water systems, and other factors and problems of that type?

Mr. MCDERMOTT. To the extent of their needs, but in the postattack period the survival needs of a civil defense program are one of a group of claimants on the total resources in the area or in the Nation. So, civil defense in that postattack period as a program becomes one of the claimants along with other claimants.

Mr. OSTERTAG. Thank you.

SCOPE OF RESOURCE MANAGEMENT PROGRAM

Mr. EVINS. Mr. Brewton, you feel it is better to have 50 copies than just to have a few carbon copies spread around in case of disaster. You have a national point of view rather than just a local one.

Mr. BREWTON. Yes, sir. I feel somewhat like Edmund Burke said, that "the only thing that is required for forces of evil to win is for the forces of good to fail to do enough." We are attempting to bring to the States and large geographical local areas the benefit of the accumulated experience which the Federal Government has had in emergency management programs, encouraging them to set up a capability within the geographical boundaries of the States and within the geographical boundaries of large areas in the States, natural units, to prepare a resource management capability consonant with what the Federal Government is planning at the Federal level.

Mr. THOMAS. Good.

FUNCTIONS OF FEDERAL AGENCIES

Now let us turn to page 42. This is "Functions of Federal agencies." For fiscal year 1962, they had $4,520,850. They will have some separate budgets and 14 or 15 different agencies will be in here tomorrow or the next day.

"Federal contributions" went over to DOD.

"Emergency supplies and equipment" went over to HEW and DOD.

"Construction of facilities" went over to DOD.

DISASTER RELIEF

There are no funds in this budget for disaster relief, the last appropriation for the President's emergency fund. In 1952 you had an appropriation of $55,800,000; the next one was in 1956, $28,500,000; 1957, $6, million; 1958, $25 million; and 1962, $21 million.

Put pages 65, 66, and 67 in the record.

(The pages referred to follow:)

Appropriation history

Fiscal year:	
1952	$55, 800, 000
1956	28, 500, 000
1957	6, 000, 000
1958	25, 000, 000
1962	21, 000, 000
Subtotal	136, 300, 000
1963 (request)	----------
Total	136, 300, 000

NOTE.—Amounts for each year include supplementals and deficiencies.

DISASTER RELIEF

GENERAL STATEMENT

All assistance by Federal agencies in major peacetime disasters is a coordinated operation under Public Law 875 of the 81st Congress, the Federal Disaster Act of 1950. Pursuant to Executive Orders Nos. 10427, 10737, 10773, and 10782

and Public Law 296, 87th Congress, the Director of the Office of Emergency Planning has the authority and responsibility for administering the act.

The act makes it incumbent upon all Federal agencies to provide assistance to States and local governments to alleviate suffering and damage resulting from major disasters. They must be prepared to act in any given disaster situation. The coordination of such plans and preparations, and the control and coordination of Federal agency assistance in natural disaster operations, are duties assigned to the Office of Emergency Planning.

Aid to a State may include emergency repair, or temporary replacement of essential public facilities such as streets and roads, sanitary facilities and schools; removal of debris and drainage of floodwaters; provision of temporary housing; emergency protection of life and property; and other emergency measures required to supplement State and local efforts.

Federal financial assistance is provided from the "Disaster relief" appropriation, under which allocations may be made directly to a State in distress, or to another Federal agency as reimbursement for its expenditures in connection with the emergency rehabilitation or restoration of facilities in the State involved. Through these allocations and reimbursements, OEP supplements the resources of State and local governments.

At the request of the President, the Joint Federal-State Action Committee considered the problem of natural disaster relief for damage to public property. In their report, the committee emphasized the responsibility of State and local governments in natural disasters. It recommended that Federal monetary assistance be extended for temporary repair or replacement of public facilities or restoration of essential public services only after there had been expended with the State, over and above normal operating expenditures, within a year's time a sum equal to or greater than a minimum sum suggested by the committee.

This recommendation was incorporated into Federal Disaster Assistance Regulations published in May 1958. A request for disaster assistance shall include the assurance of the expenditure of a reasonable amount of the funds of States, local governments, or other agencies therein, for alleviating damage resulting from such disaster. Federal assistance under Public Law 875 will be available only after the governor certifies that the total expenditures and obligations for disaster relief exceed an amount published annually by the director as the minimum for that State.

DETAIL OF REQUIREMENTS

Obligations for aid to disaster areas in fiscal year 1961 totaled $13,043,851, including administrative expenses.

Obligations in 1962 will rise to $19 million (principally due to the damage caused by Hurricane Carla), and in 1963 will return to a more normal level of approximately $16 million.

Appropriations presently available, together with $4 million in recoveries in 1963, will be adequate to cope with anticipated funding requirements during the budget year.

BASIS OF BUDGET ESTIMATE

Mr. THOMAS (reading):

Obligations for aid to disaster areas in fiscal 1961 totaled $13,043,851, including administrative expenses.

Obligations in 1962 will rise to $19 million (principally due to the damage caused by Hurricane Carla), and in 1963 will return to a more normal level of approximately $16 million.

Appropriations presently available, together with $4 million in recoveries in 1963, will be adequate to cope with anticipated funding requirements during the budget year.

How much money is in the President's budget at this time?

Mr. MCDERMOTT. Sir, this budget submission was prepared on the basis of our average annual experience in this program.

Mr. THOMAS. $16 million.

Mr. MCDERMOTT. It was thought the $12 million being carried in the account, plus $4 million in recoveries in 1963, would be adequate to cover it.

Mr. THOMAS. You have $16 million, then.

ESTIMATED COST OF RECENT DISASTERS

Mr. McDermott. Unfortunately, the situation has changed very markedly in the last few weeks, specifically in the last week. The March 1, 1962, balance in the President's fund was $13,205,000. An allocation of $2,760,000 was made to the State of California on March 6. Since that time, major disasters have occurred and have been declared by the President in New Jersey, Maryland, Delaware, Virginia, West Virginia, and today the President is making a declaration with reference to the State of Kentucky. Preliminary estimates indicate that allocations would be approximately the following on these storms which caused tremendous public and private damage:

There is a supplemental in Idaho of $1 million due to heavy snowfalls and additional damage since the allocation was first made.

New Jersey's damage is estimated to run at $10 million; Maryland, $1 million; Delaware, $500,000; Virginia, $1 million; West Virginia, $750,000; Kentucky, $1 million.

So, we presently have, after the California allocation from the $13,200,000, a balance of $10,360,000. It is obvious that with the storms which have occurred in the last week, this account will find itself in the red, and there will have to be a supplemental submission to this committee on the natural disasters.

Mr. Thomas. Are you prepared to state how much that will be?

Mr. McDermott. It has not been computed yet, sir, because these storms have just occurred, and we cannot make a reliable estimate in this flooding situation of what the extent of the damage will be.

Mr. Thomas. Have you an approximate figure?

Mr. McDermott. To take us through the balance of this year, with last week's storms, and all of fiscal year 1963, will require $25 million.

POSTATTACK PLANNING

CONTRACTS WITH STATES

Mr. Thomas. Turn back to the postattack planning program, please. What part of the $3 million will be spent for salaries at the Federal level and what part at the State level? Generally, where will the money be spent?

Mr. Brewton. No part of the $3 million will be spent at the Federal level. It is conceived as a program under which contracts will be entered into with the States. The States will be required to state what facilities and people they will put up, and they will be required to state the value of privately contributed services and time of business and other executives.

Mr. Thomas. Is there any limitation on how much each State will get? The only statement you have on that in your justifications is that the estimates range from $25,000 to $300,000 for the States, and from $10,000 to $100,000 for local geographic areas. Is there any limitation on what one State can get?

BASIS OF COST ESTIMATE

Mr. BREWTON. Yes, sir, I can answer that question by saying that that $3 million is factored on the basis of $14 per thousand population. The $25,000 is to give the most sparsely settled State an idea of how much it could expect.

Mr. THOMAS. It is $14 per thousand population. If a State has 10 million population, it will get so much, and if a State has 1,500,000, it will receive aid on the same basis.

Mr. BREWTON. That is exactly right. As a matter of fact, we have factored it out for the whole 3-year period.

Mr. THOMAS. The whole 3-year period you estimate to cost around $10 million.

Mr. BREWTON. We figure not over $10 million. As a matter of fact, we have gone very far in the preparation of materials in order to safeguard the use of this money.

OTHER OBJECTS OF EXPENSE

Mr. THOMAS. Mr. Budget Officer, can you pull together at one point for the record the breakdown of your Other Objects?

Mr. RICE. Yes, sir.

Mr. THOMAS. Let me see that, please.

Mr. RICE. The green sheet shows the total, of course.

Mr. THOMAS. That is a pretty poor substitute for a breakdown.

Mr. RICE. Would you like a breakdown on each of the categories or budget activities?

Mr. THOMAS. I certainly would.

Mr. RICE. For example, we can break each activity down into personnel compensation, travel, transportation of things, any way you would like it.

Mr. THOMAS. Let us have it.

Mr. RICE. Page 8 is the major breakdown.

Mr. THOMAS. There is no justification here. Have you a justification?

Mr. RICE. We can take each of these breakdowns and in the succeeding pages we explain how we propose to use the money specifically.

Mr. MCDERMOTT. Beginning on page 14, I believe, Mr. Chairman.

Mr. THOMAS. Mr. Reporter, insert again at this point page 8.

(The page referred to follows:)

Personnel summary

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Permanent positions	551	500	450	−50

Summary of obligations by object class

		1961 actual	1962 estimate	1963 estimate	1963/1962 difference
11	Personnel compensation	$5,258,479	$5,042,000	$4,709,000	−$333,000
12	Personnel benefits	375,013	358,020	335,000	−23,020
21	Travel and transportation of persons	345,539	347,606	325,000	−22,606
22	Transportation of things	21,471	73,500	35,000	−38,500
23	Rent, communications, and utilities	182,455	197,150	166,000	−31,150
24	Printing and reproduction	160,241	238,450	300,000	+61,550
25	Other services (including services of other agencies)	6,650,227	1,501,989	1,900,000	+398,011
	Civil defense	17,786,746	906,074		−906,074
26	Supplies and materials	51,609	58,700	75,300	+16,600
31	Equipment	39,549	46,800	154,700	+107,900
	Unvouchered	2,500	3,000		−3,000
	Total obligations	30,873,829	8,773,289	8,000,000	−773,289

TRAVEL

Mr. THOMAS. We have gone over this once, but we did not go into detail. Let us look at travel; $172,000 for 1963.

Field conferences are held with OEP area directors to give them advice on program planning; and with State attorneys general and their staffs, and State civil defense staffs to discuss proposed State legislation recommended by the OEP for emergency Government operation.

Instead of showing a decrease of $23,000 in travel this year, it appears to me you have a sizable increase over last year.

Mr. RICE. No, sir, we are going from $195,000 to $172,000.

Mr. THOMAS. Is this your entire travel bill?

Mr. RICE. No, sir.

Mr. THOMAS. That is what I am asking you about. Can you pull it all together in one, here?

Mr. RICE. On page 8, it is indicated the entire travel expense of people is going down from $347,000 to $325,000, or a $22,000 net decrease. Of course, the decrease is due primarily to the fact that we do not have the Battle Creek second headquarters organization, and last year there was a considerable amount of travel back and forth.

Mr. THOMAS. You have $325,000 this year against $350,000. You have 1,650 employees last year against around 500 or 550. It appears to me that on an employee basis there is an increase instead of a decrease. You show a slight decrease in travel and you have a 75-percent decrease in personnel. Any way you figure it, there is an increase in travel.

Mr. MCDERMOTT. This only reflects the OEP portion of that earlier budget, sir. This does not reflect the total travel in OCDM.

Mr. THOMAS. Is this your total travel now?

Mr. RICE. The $347,000 is the OEP piece that remained with us at the time of the split between OEP and OCD. In other words, that was our OEP identifiable share. For the OEP identifiable share next year we are asking only $325,000.

Mr. THOMAS. What is your total travel bill for the year, $325,000?

Mr. RICE. For next year, we are asking that, yes, sir.

Mr. THOMAS. What did you have last year?

Mr. RICE. $347,000.

Mr. THOMAS. Was that the total travel bill for the agency last year?

Mr. RICE. No. That was for the OEP part of it, represented by 551 people after civil defense was transformed to DOD.

Mr. THOMAS. Yes, but you were not split away until——

Mr. RICE. August.

Mr. THOMAS. You were not split away in August. It was later than August.

Mr. MCDERMOTT. All the accounting was as of August 1, sir.

Mr. THOMAS. Dated back to August 1?

Mr. MCDERMOTT. Yes. The Executive Order 10952 issued July 25, and the cutoff date was August 1.

Mr. THOMAS. Based on 11 months, then.

Mr. MCDERMOTT. That is correct.

Mr. THOMAS. That is exactly what it was last year, then.

Mr. RICE. I do not have the exact figure for the total OCDM budget for travel, but I understand they got around $550,000, and we got $347,606 at the time of the split.

TRAVEL REQUIREMENTS BY ACTIVITY

Mr. THOMAS. Where is the rest of your travel?

Mr. RICE. The figure you were looking at, $172,000, is "Executive direction," and each of the other three categories have travel in them, too. "Emergency planning" has travel——

Mr. THOMAS. How much is in that?

Mr. RICE. "Emergency planning" has $84,000 this year, and we are asking for the same amount next year. Resources production——

Mr. THOMAS. What page was that?

Mr. MCDERMOTT. The specifics are on page 23, sir.

It appears initially at page 20, and the specifics are on page 23.

Mr. RICE. For emergency planning, we are asking for the same amount for travel, $84,000.

Mr. THOMAS. Do you have any more travel besides these two items?

Mr. RICE. Under "Resources and production planning," the third budget activity, we ask for $69,000, and we have $68,500 this year.

PRINTING AND REPRODUCTION

Mr. THOMAS. I will go back to your justification sheet, which is already in the record. Why do you need $300,000 for printing, an increase of $61,550? Where is that set out?

Mr. RICE. Again, we have printing in all three of those budget categories—"Executive direction," "Emergency planning," and "Resources and production planning."

Mr. THOMAS. Where is the increase? Turn to the pages and let me see if I have checked them over.

Mr. RICE. "Executive direction," printing, is found on page 16, a decrease of $7,000 from $39,000 to $32,000. There we have administrative printing, a reduction from $39,000 to $32,000, a reduction of $7,000.

TRAINING COSTS

Mr. THOMAS. I have checked here, "Training costs, Public Law 507," $7,000. Are you in the schoolteaching business, too?

Mr. RICE. We have $7,000 this year. As you know, this is planned under Public Law 85–507 which permits agencies to spend Government money to train people on the job, that is, to train people to do a more effective job. This includes, in some cases, night school.

INCREASE IN PRINTING

Mr. THOMAS. You give us a few words on administrative printing, but no information.

This estimate covers headquarters and area office requirements for contractual printing of forms, form letters, letterheads, manuals, administrative orders, and administrative releases; and special studies and reports.

Mr. MCDERMOTT. Mr. Chairman, I believe this might simplify it, if possible. The green sheet gives the totals on these classes——

Mr. THOMAS. We understand that. I am just looking for the details of that $32,000.

Mr. MCDERMOTT. Then in each of the four budget categories we give a detailed breakdown of these various costs. The big increase in printing——

Mr. THOMAS. Where is that detailed breakdown?

Mr. MCDERMOTT. It follows behind each one of the four budget categories in this area.

Mr. THOMAS. I just read one. I did not find any details in it. You set out classes of publications.

Mr. MCDERMOTT. The detail there, sir, was not as great as it might be because there is a decrease in the request.

Mr. THOMAS. All right. We got tired when we got up there.

Mr. MCDERMOTT. If you look at page 23, this identifies the major increase in the printing appropriation request.

Mr. THOMAS (reading):

The amount requested covers information bulletins, materials supplied to news media, copies of the national plan and annexes, research papers, and periodic and annual reports on Defense Production Act functions. The increase requested in 1963 is related to the need for the revision and reprinting of the "National Plan for Civil Defense and Defense Mobilization" and its 39 annexes, at a cost of approximately $150,000. The national plan is an essential element in providing coordination and guidance to Federal agencies and State and local governments, all of which are engaged in emergency planning and readiness activities.

PRINTING OF NATIONAL PLAN AND ANNEXES

Mr. MCDERMOTT. As the chairman knows, the national plan and the annexes was prepared a number of years ago, and has had wide distribution. It is the principal planning document of all the departments of the Federal Government.

Mr. THOMAS. How many national plans have we had so far?

Mr. MCDERMOTT. You mean in terms of numbers of copies, sir?

Mr. THOMAS. No; plans.

Mr. MCDERMOTT. There is 1 national plan, with 39 annexes.

Mr. THOMAS. Yes. Would you say there have been 39 plans?

Mr. MCDERMOTT. The annexes address themselves to specific parts of the program. The fact is——

Mr. THOMAS. Is it worth that $150,000?

Mr. McDermott. There is only this about it, sir: With major changes which have taken place in planning, including in civil defense—there is a new civil defense program presumably evolving here—the national plan has to be brought up to date with changes. It is a matter being considered.

Mr. Thomas. We have asked you to pinpoint where there are appreciable changes in your activities in 1963 as compared to what you have been doing since 1950, but we have not been able to get a very specific and definite answer.

Mr. McDermott. The request, sir, does not relate to a change in activities. This is a disbursement that would have to be made to bring the national plan, some 100,000 copies of which have been distributed over the past years, up to date to reflect the current plan. A lot of changes are taking place in a number of areas.

Mr. Thomas. I thought more than 100,000 copies of the plan were printed and circulated.

Mr. McDermott. I think the figure is approximately——

Mr. Stokley. I think 108,000.

Mr. Thomas. We have just circulated some material on defense shelters. Of course, that is not under your jurisdiction. I think, if I remember correctly, there are about 5 million left, and some 30 or 40 million printed. Do you know what that cost?

Mr. McDermott. Yes, sir; I have an idea.

Mr. Thomas. What?

Mr. McDermott. It was finally something like $1½ million.

Mr. Thomas. Of course, that is not a part of your budget. That is the other one.

Mr. McDermott. This is not that type of document, sir. This is the national plan which has been the primary guide of all segments of the Federal Government and most segments of State governments.

Mr. Thomas. You have had 39 amendments to it. I do not know whether anybody is going to pay any attention to it, with all those amendments.

Mr. McDermott. Those are annexes, sir, and not amendments. Those relate to specific resource areas.

SUPPLIES AND MATERIALS

Mr. Thomas. What about supplies and materials, which go up, and the increase for other services? What page is that on?

Mr. Rice. Each of these categories is broken down. That particular plus, as you indicated, is $16,600. Supplies and materials first appears under "Executive direction," and that is on page 17.

Mr. Thomas. You have some data processing equipment in here. I underlined here: "Control center supplies. See page 18, $20,500."

Mr. Rice. That is for the initial stocking of the new Denton facility.

Mr. Thomas (reading):

> This facility provides occupancy for 200 persons on a day-to-day basis and 500 during the "button-up" period. The estimate includes $10,000 for emergency survival rations to feed 500 persons for 30 days; $3,000 for blankets, sheets and pillow cases for 252 sleeping cots; $2,500 for towels, coveralls, and protective clothing; and $5,000 for miscellaneous items.

That makes up your $20,500.

Mr. RICE. Yes, sir.

Mr. THOMAS. In 18 months, if we do not have any emergency, they will all be lost, thrown away, or not be found?

Mr. RICE. We feel most of them are not expendable, and we will not have to be budgeting for them again next year.

Mr. THOMAS. What makes up that $75,300? That is $20,500. What is the rest of it? You have some furniture here and some office machines. [Reading:]

This estimate ($10,000 for headquarters and $7,000 for the area offices) covers procurement of new and replacement furniture. * * *

Mr. RICE. The big item of the increase is $120,000 due to their new facility at Denton, Tex. This is for the initial outfitting of that facility.

(Off the record.)

OTHER SERVICES

Mr. THOMAS. Let us look at "Other services," services of other agencies, an increase of $400,000 over last year.

On what page is that?

Mr. RICE. Mr. Chairman, the portion under "Executive direction is shown on page 16.

Mr. THOMAS. Why are you spending $50,000 on security investigations?

Mr. RICE. We get our security investigations from the Civil Service Commission. They do the job for us. The average is $365 per investigation. We need to check out 135 new people every year.

Mr. THOMAS. Out of 450 employees your turnover is one-third?

EXECUTIVE RESERVES

Mr. RICE. This includes the Executive Reserves, consultants, unsuccessful applicants. The Executive Reserves must be checked out.

Mr. OSTERTAG. Who are your Executive Reserves?

Mr. RICE. Successful, well-known community business leaders who are in the OEP Executive Reserve and have emergency assignments.

Mr. THOMAS. When did you create that group? BDSA in the Department of Commerce has been engaged in that activity 10 to 15 years.

Mr. MCDERMOTT. Virtually all executive departments have an Executive Reserve of which BDSA is a part.

Mr. THOMAS. BDSA is supposed to have Executive Reserves for the industrial world. That is their function.

Mr. OSTERTAG. You are down to 450. What is your turnover?

Mr. RICE. Our total security investigations are around 135. That has been the experience in the current year and the previous year.

Mr. THOMAS. What did you spend in the year 1962 in the first 6 months on security investigations?

Mr. RICE. I can tell you our obligation to date as of the 28th of February. It is $36,300.

Mr. THOMAS. It will cost about $350 per person to Civil Service provided you do not go to the FBI. If you go to the FBI it will cost you more money?

Mr. RICE. That is right, normally.

Mr. THOMAS. The rate of turnover is 33⅓ percent?

Mr. RICE. We have about 135 security investigations each year. This includes the regular new employees, the summer employees, and student employees we use. These are the college people we hope some day to influence in coming into Government, particularly into our Agency. It also includes the Executive Reserves, those job applicants who weren't finally appointed, and consultants.

OPERATION OF EXECUTIVE RESERVE PROGRAM

Mr. THOMAS. How many do you have in the Executive Reserves doing that work?

Mr. RICE. 367 as of December 31.

Mr. THOMAS. Do they come here and have meetings? What useful purpose do they serve?

Mr. COSGROVE. The authority of the Executive Reserve is under Executive Order 10660. We have had this for some years and there are periodic meetings averaging about every second year with all the Executive Reservists coming to Washington.

Mr. THOMAS. You pay them per diem?

Mr. COSGROVE. Yes, sir. There is a per diem paid by some of the agencies. This varies from agency to agency. In our case we pay per diem.

Mr. MCDERMOTT. Some contribute their own services. Some get $15 per diem.

Mr. THOMAS. How about travel?

Mr. MCDERMOTT. There again it varies. They are eligible for reimbursement.

Mr. THOMAS. How many do you have in the Executive Reserve?

Mr. MCDERMOTT. 367.

Mr. COSGROVE. 367 in our unit.

Mr. THOMAS. What did you spend in 1961?

Mr. RICE. We haven't that figure here.

Mr. THOMAS. Where is it set out in your budget?

Mr. RICE. It is not reflected as a specific item in itself, sir.

Mr. THOMAS. Why isn't it?

Mr. WALL. These are high-caliber people who can pay their own way. We sometimes have travel expenses but this is a minor part of our travel bill.

Mr. RICE. It is unusual for us to pay all of the Executive Reserves expenses.

Mr. THOMAS. What did you spend on them in 1961? That is a completed year?

Mr. WALL. We do not keep the record in that manner.

Mr. MCDERMOTT. That figure can be determined, Mr. Chairman. The travel and per diem costs of Executive Reserves in 1961 was $10,060.

Mr. THOMAS. What function do they serve for you which they do not serve in the Department of Commerce?

Mr. COSGROVE. The Executive Reserve exists in approximately 20 different agencies or departments of the Government. The largest one is BDSA Executive Research. These people have expertise in in-

dustry, business, information they can supply, and they are standby people who can come in on an emergency basis.

Mr. THOMAS. We call those outside BDSA consultants and they are usually paid as consultants.

Mr. EVINS. Reserve gives them a higher title, Mr. Chairman.

EXECUTIVE RESERVES IN OTHER DEPARTMENTS

Mr. THOMAS. What agencies have them besides BDSA and you?

Mr. MCDERMOTT. BDSA has 1318. The Department of Commerce, exclusive of BDSA, has 338. OEP has 367. Interstate Commerce Commission 160. USIA has 75. Department of Interior has 161. Department of State has 50. Department of Justice has 36. The Office of the Secretary of Defense has 27. The HHFA has 34. Small Business Administration has 21. The Navy has 15. Labor has 69. The FCC has 20. GSA has 5. The Department of the Army has 10 plus unit X, 22. The total is 2,728 reservists.

EXECUTIVE ORDER ESTABLISHING EXECUTIVE RESERVE

Mr. THOMAS. By what authority were those units set up? You say it was an Executive order?

Mr. COSGROVE. No. 10660 and the Defense Production Act.

Mr. THOMAS. Read that into the record at this point. Read the Executive order and the date of it.

Mr. KENDALL. This is section 710(e) of the Defense Production Act of 1950. [Reading:]

> The President is further authorized to provide for the establishment and training of a nucleus Executive Reserve for employment in executive positions in Government during periods of emergency. Members of this Executive Reserve who are not full-time Government employees may be allowed transportation and not to exceed $15 per diem in lieu of subsistence while away from their homes or regular places of business for the purpose of participating in the Executive Reserve training program.

That is the basic authority.

Mr. MCDERMOTT. Now the Executive order.

Mr. KENDALL. We do not have a copy of the order here.

Mr. THOMAS. He had to implement that by an Executive order. Now he wants that.

Mr. EVINS. That specifies the various agencies to which the Director referred?

Mr. KENDALL. Central management in what was ODM.

Mr. MCDERMOTT. We will supply you the Executive order.

Mr. THOMAS. Please insert it in the record.

(The Executive order referred to follows:)

EXECUTIVE ORDER 10660, PROVIDING FOR THE ESTABLISHMENT OF A NATIONAL DEFENSE EXECUTIVE RESERVE

By virtue of the authority vested in me by the Constitution and laws of the United States, including sections 703(a) and 710(e) of the Defense Production Act of 1950, as amended (50 U.S.C. App. 2153(a); 2160(e)), and as President of the United States, it is hereby ordered as follows:

SECTION 1. There is hereby established in the executive branch of the Government a National Defense Executive Reserve to be composed of persons selected from various segments of the civilian economy and from Government to be

trained for employment in executive positions in the Federal Government during periods of emergency.

SEC. 2. The Director of the Office of Defense Mobilization is hereby directed to institute and administer the Executive Reserve program; to coordinate the activities of other agencies in establishing units of the Reserve; to provide for appropriate standards of recruitment and training; and to issue necessary rules and regulations in connection with such program.

SEC. 3. The Director of the Office of Defense Mobilization in carrying out his responsibilities under this order may utilize the services of other departments and agencies in the maintenance of agency and centralized rosters and in the development of training programs and materials.

SEC. 4. Heads of departments and agencies of the Government designated by the Director of the Office of Defense Mobilization, after appropriate consultation, are authorized to establish units of the Executive Reserve and to select and designate persons to serve as members of the units.

SEC. 5. Activitiess of persons by reason of designation as Executive Reservists under this order shall not include acting or advising on any matter pending before any department or agency but shall be limited to receiving training for mobilization assignments under the Reserve program. With respect to activities as so limited, reservists who are not full-time Government employees shall be exempt from the operation of sections 281, 283, 284, 434, and 1914 of title 18, United States Code, and section 190 of the Revised Statutes (5 U.S.C. 99).

SEC. 6. The Director of the Office of Defense Mobilization shall report to the President annually, and at such other times as may be appropriate, on the progress made in the development and operation of the Executive Reserve program.

DWIGHT D. EISENHOWER.

THE WHITE HOUSE, *February 15, 1956.*

COST OF EXECUTIVE RESERVE

Mr. THOMAS. You do not know what it costs each year?

Mr. MCDERMOTT. Actually very little. Travel and per diem in 1961 amounted to $10,060. These men frequently and generally do not ask for per diem and in many instances do not ask for their transportation expenses. It is truly a group which is performing what I believe is a valid public service.

Mr. OSTERTAG. Your costs are limited to the number associated with your work?

Mr. MCDERMOTT. That is correct, but because of their accessability to secret information and classified information we must have the security clearance on these people before they can be brought into this program.

Mr. OSTERTAG. Is it possible that the same person is investigated more than once?

Mr. MCDERMOTT. On those investigations, sir, they are all done by name and individual. Any security investigation we might ask for regarding any individual would pick up where the last one left off, if there was one.

UNDERGROUND CONTROL CENTER, DENTON, TEX.

Mr. THOMAS. Put your finger on your equipment. You have furniture, office machines, control center equipment. How many of those control centers do you have now?

Mr. RICE. This $120,000 is what we need initially for Denton.

Mr. THOMAS. You have one at Boston?

Mr. RICE. That is almost 2 years away.

Mr. THOMAS. What work is being done on it now?

Mr. BREWER. We are now in the process of adapting standard designs developed in the Denton experience to topography we have tentatively selected at the Fort Devens Reservation. In recent months we have been working with the Department of the Army negotiating for the use of that land. We have also worked with the Office of Civil Defense.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

Mr. THOMAS. What are you going to spend $12,000 for at the completed center?

Mr. MCDERMOTT. The detail of that is on page 19, sir.

Mr. THOMAS. Insert page 19 in the record.

(The page referred to follows:)

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Extraordinary expenses of the Director	$2,500	$3,000		−$3,000

These expenses are financed in 1963 under an appropriation to the Executive Office of the President.

Control center equipment.—(For supplies, see object class 26.) This estimate provides for the purchase of furniture and other nonexpendables needed to equip the Denton, Tex., underground control center. Major items include: (*a*) $45,000 for desks, chairs, filing cabinets, tables, etc. These will be of all-steel construction and smaller than standard size, in order to reduce fire hazard and conserve space; (*b*) $30,000 to equip the war room with seats, and special purpose items—including wall maps and boards, and projection equipment; (*c*) $21,000 for the bunking area. This will provide 84 three-tier bunks at an average cost of $250 per tier; (*d*) $10,000 for personal storage lockers; (*e*) $3,500 to equip a first aid room; and (*f*) $2,500 for cafeteria tables, chairs, and cutlery, kitchen accessories, and snackbar equipment.

Mr. THOMAS. There is not too much information on it. This estimate provides for the purchase of furniture and other nonexpendables needed to equip the Denton, Tex., underground control center. Major items include $45,000 for desks, chairs, filing cabinets, tables, and so on—these will be all-steel construction; $30,000 is to equip the war room with seats and special purpose items, including wall maps and boards and projection equipment. There will be $21,000 for bunking area. This will provide 84 three-tier bunks at an average cost of $250 per tier; $10,000 for personal storage lockers, $3,500 to equip a first-aid room, and $2,500 for cafeteria tables, chairs, and cutlery and kitchen accessories.

These expenses are financed in 1963 under an appropriation to the Executive Office of the President.

Mr. MCDERMOTT. That relates to the extraordinary expenses of the Director which have disappeared this year.

UNDERGROUND CONTROL CENTER FACILITIES

Mr. EVINS. How much floor space is there?

Mr. RICE. At Denton, Tex.?

Mr. EVINS. Yes.

Mr. RICE. It allows for every day working groups of 200 and there will be expansion to 500 during the "button up" period.

Mr. McDermott. The underground protective portion is a two-story reinforced concrete structure containing approximately 48,000 gross square feet of operationally equipped space to accommodate 500 person for 30 days without outside utilities or supplies. There is also an aboveground building containing 4,200 square feet for nonemergency use for reception and administrative space.

Mr. Thomas. How many feet underground do you have, 48,000 feet?

Mr. Rice. Yes.

Mr. Thomas. Have you started?

Mr. McDermott. Construction started June 27.

Mr. Thomas. I was there in October and didn't see any dirt flying.

Mr. McDermott. Construction began on the 27th of June. I have not personally seen it but it is scheduled for completion this year. Turnkey completion will be January 1, 1963.

Mr. Thomas. This is a wartime activity. This is life and death. You certainly should complete it for about one-third the $120,000. This is no playhouse party, but life and death. That is the only reason you are building it.

Scale down your sights considerably.

ANALYSIS OF STATE LAWS

Mr. Jonas. How much money do you spend analyzing State laws to find out whether they are adequate for emergencies?

Mr. Stokley. $15,000 in 1961, $15,000 in 1962, and we are asking $20,000 for 1963 to complete the job.

Mr. Jonas. Don't you think it is pretty farfetched, to bring the statutes and laws from 50 States to Washington for you to go over? Why don't you write the attorney general of the State of North Carolina and have him tell you the laws of that State concerning emergencies? How do you justify this?

Mr. Stokley. We do not bring the laws here.

Mr. Jonas. How do you analyze them, then?

Mr. Stokley. We ask New York University to do this for us. They have the laws in their——

Mr. Thomas. The Library of Congress can do it.

Mr. Jonas. Did you ever think of asking the attorney general of each State to do it?

Mr. Stokley. It is a matter of analyzing laws from the standpoint of their adequacy to meet these emergency situations.

Mr. Jonas. There is nothing peculiar about this which would enable a university to do a better job than the Attorney General. What about the Library of Congress? Did you think about asking them to take a look at this?

Mr. Stokley. I cannot answer that.

Mr. Jonas. Who analyzed the North Carolina statutes for you?

Mr. Stokley. I am sorry, sir. I don't know what year that was done. I think we had the University of Wisconsin Law School doing some of it.

Mr. Jonas. What is it about the Capital here in Washington that causes people working for the Government to think they have so much more knowledge than people in the State capitals?

I can understand how they need to be guided and directed in working out plans, but you do not need an expert to go over the laws of

the different States to tell the Governors that their State statutes are inadequate to take care of emergencies, do you?

Mr. STOKLEY. I think it is more than that. It is a matter of finding out exactly how they might be fixed. This gets into problems of drafting and this is something which takes time and effort in order to help move this along. So far this program——

Mr. JONAS. It is just another program with another grant which you handle and "dish out" some of Uncle Sam's money to a research organization to study the laws of the different States to find out how they need to be amended.

What do you think the legislatures of these States are doing? Are they completely ignorant on this subject, the members of the general assembly, the Governors, and the attorney general?

CONTINUITY OF EXECUTIVE CONTROL

Mr. MCDERMOTT. No, sir, but they are appreciative of this service in most States. This has resulted in emergency laws being passed in the majority of States to assure continuity of executive control.

Mr. JONAS. You think it is really justified, then?

Mr. STOKLEY. Yes, sir.

Mr. JONAS. And worth the money?

Mr. STOKLEY. I have heard very few people who did not think it was a very valuable service.

Mr. JONAS. You have not had many people look at it as closely as we are looking at it. They have been the beneficiaries of the service instead of those providing the money.

Mr. BREWER. Here is a chart in which you might be interested, Mr. Jonas.

Mr. JONAS. I am in favor of emergency legislation to provide for continuity of government, all right, but I am a little doubtful of the wisdom of spending this amount of money analyzing the statutes and laws of 50 States. I would think all you would need to do is to direct a communication to the Governor in each State and request him to have the laws of his State closely examined by the people responsible to be sure that a certain program is carried out rather than hiring somebody to analyze the entire statute law of each State.

PROPORTION OF OTHER OBJECTS OF EXPENSE

Mr. THOMAS. Right in that regard, salaries are $4,700,000 and the personal benefits $335,000, giving a total of $5,044,000. Against that you have $3 million of other objects. What you are talking about comes under other objects. In other words, about 38 percent of the amount is other objects. We usually require 20 to 25 percent.

Mr. JONAS. Just an idea.

Mr. MCDERMOTT. It is a helpful suggestion, sir.

Mr. THOMAS. Further questions?

Gentlemen, we thank you very much. Most of you are new at the job but you have done very well and we have been delighted and honored to have you.

I am sure next year you will have your budget in somewhat better shape. It really wasn't too bad this time.

Good luck to all of you. We shall take your counterpart tomorrow and the cooperating Federal agencies when we can get to them.

Mr. MCDERMOTT. Thank you, sir.

THURSDAY, MARCH 15, 1962.

CIVIL DEFENSE AND DEFENSE MOBILIZATION FUNCTIONS OF FEDERAL AGENCIES

WITNESSES

WILLIAM B. RICE, DIRECTOR OF ADMINISTRATION, OFFICE OF EMERGENCY PLANNING
RALPH B. THOMPSON, RESEARCH, POLICY, AND REVIEW DIVISION
RODGER W. WALL, CHIEF, BUDGET BRANCH
HUBERT R. GALLAGHER, DIRECTOR OF SPECIAL LIAISON

Mr. THOMAS. Gentlemen, will the committee please come to order?

We have with us this morning our many friends from the Office of Emergency Planning and the various departments and agencies of government concerned with civil defense functions.

From the Office of Emergency Planning we have Mr. William B. Rice, Director of Administration; Mr. Ralph B. Thompson, Research, Policy and Review Division; Mr. Rodger W. Wall, Chief Budget Branch.

Mr. RICE. Just the two are here. The others are outside if they are needed.

Mr. THOMAS. We have Mr. Hubert R. Gallagher, Director of Special Liaison. Who is present this morning?

Mr. THOMPSON. Mr. Rice and I are here.

Mr. THOMAS. We are delighted to have you.

Gentlemen, I call your attention to the summary table at the beginning of the justification. This identifies the various agencies and the amounts requested. Mr. Reporter, we will insert this table in the record at this point.

(The table referred to follows:)

Summary of obligations by agency

Department or agency	1961 actual	1962 estimate	1963 estimate	1963 compared with 1962, difference
1. Department of Agriculture	$280,744	$343,645	$305,000	−$38,645
2. Department of Commerce	2,577,887	2,485,282	2,800,700	+315,418
3. Federal Aviation Agency	148,754	121,000	200,000	+79,000
4. Federal Communications Commission	15,292	15,300	67,509	+52,209
5. General Services Administration	95,200			
6. Department of Health, Education, and Welfare	[1] 1,634,244	[2] 37,347,000	[2] 42,106,000	+4,759,000
7. Housing and Home Finance Agency	160,000	160,875	250,000	+89,125
8. Department of the Interior	365,649	429,100	486,500	+57,400
9. Interstate Commerce Commission	70,000	70,000	175,000	+105,000
10. Department of Labor	1,065,393	978,348	1,285,000	+306,652
11. Post Office Department	25,000	11,000	11,000	
12. Treasury Department		67,363	80,000	+12,637
13. Small Business Administration	15,839	16,200	42,000	+25,800
14. Veterans' Administration	16,663	16,700	17,000	+300
Total obligations	6,470,665	42,061,813	47,825,709	+5,763,896
Unobligated balance lapsing	96,335			
New obligational authority	6,567,000	42,061,813	47,825,709	+5,763,896

[1] The 1961 figure does not include funds for stockpile management and procurement.
[2] The fiscal years 1962 and 1963 estimates include stockpile management and procurement.

Department of Agriculture

WITNESSES

ROBERT S. REED, SPECIAL ASSISTANT TO THE SECRETARY FOR CIVIL DEFENSE
GEORGE H. WALTER, DEFENSE ASSISTANT, OFFICE OF THE SECRETARY

Mr. Thomas. At this time we have the pleasure of welcoming the distinguished gentleman from Agriculture.

We have Mr. Robert S. Reed, special assistant to the Secretary for Civil Defense; Mr. George H. Walter, Defense Assistant, Office of the Secretary; and Mr. John Wells, Office of Budget and Finance.

Are you three gentlemen the only three present?

Mr. Reed. Mr. Wells is not here, sir. There are just two of us.

Mr. Thomas. Mr. Reed, do you have a statement for us?

I notice you have a budget here this year for $305,000 against $343,645 for 1962, and $280,744 for 1961. That is about $39,000 less than you had for 1962. Do you have a statement for us? If so, we will be delighted to listen to you. We welcome you aboard. We are always glad to have our farmer friends in here.

Mr. Reed. Mr. Chairman, members of the committee, I have a very brief statement that I do not think will take over about 5 minutes.

We have the unique distinction of being one that has less money requested than the previous year.

Mr. Thomas. For years you did not request any.

Mr. Reed. That is right, sir.

May I proceed with my statement?

Mr. Thomas. Surely.

General Statement

Mr. Reed. Mr. Chairman and members of the committee, my purpose in being here is to give you a brief explanation of the special funds for civil defense planning included in the USDA budget for 1963. The budget items being discussed here are largely to replace funds formerly allocated to Agriculture from OCDM and its successor agencies. The $305,000 included in the budget estimate for 1963 provides for no increase in defense activities. It does allow for some change in emphasis, but in the use of approximately the same amount of money as was made available to USDA in fiscal years 1961 and 1962.

I want to make it clear that in addition to the budget item mentioned, practically every agency within Agriculture has been devoting some time and money to defense planning. These absorbed costs include participation in exercises such as Operation Alert, development of information on locations of important agriculture facilities in a manner usable in defense planning and in meeting USDA post-attack operational needs, and in carrying out other related defense activities. For example, the Forest Service under its regular assignment to provide forest fire protection has done considerable work in preparing against fires that might result from a nuclear attack.

FIREFIGHTING ACTIVITIES

Mr. THOMAS. If I may interrupt you, the Forest Service is quite busy and is busy every year fighting fires on the public domain, particularly in California. How can they distinguish between preparing to prevent a fire that normally occurs and one from bomb blast? Last year they spent $157 million, including the regular and supplemental appropriation fighting fires.

Mr. EVINS. That is one of the main functions of the branch.

Mr. THOMAS. We usually have a deficiency every year to cover it. It is a figure that you cannot come up with 12 months in advance with any degree of accuracy because you cannot control the starting of a fire. It is a matter that you cannot anticipate with any degree of accuracy. It runs into money.

Mr. REED. May I add one point, that the extent of fires from a nuclear attack would be way beyond that of fires that normally break out in the forest. The fire effect of a nuclear attack could affect most of the approximately 93 percent of the land area of the United States regarded as rural areas. Any plans that are made by the Forest Service, in case of a nuclear blast, would be in connection with something much greater than the normal type of fires.

Mr. THOMAS. If it will affect 93 percent of all the land of the United States, we will not have too much to worry about. There won't be anybody around to do any worrying.

MEAT AND POULTRY INSPECTION

Mr. REED. That would be correct, sir.

Likewise, our meat and poultry inspectors are receiving monitoring training which would, in case of an emergency, enable them to determine the freedom of meat from contamination by fallout as well as provide the normal purity inspection.

CIVIL DEFENSE ACTIVITIES

Attached is a table showing the appropriation requested and funds available specifically for the civil defense activities in fiscal year 1963 and the two previous budget years. As you will note, the first item, radiological defense training and training materials indicates an increase to the Agricultural Research Service for this purpose in 1963. We believe that increased attention is needed to acquaint all meat inspectors with procedures for testing for fallout and for training information materials. This 1963 item under Agricultural Research Service would in effect include the radiological defense training costs budgeted to Soil Conservation Service and Forest Service in 1962. The Department of Defense is cooperating in this endeavor by providing 600 additional sets of instruments primarily for these inspectors. They have also agreed, subject to budget limitations, to provide dosimeters and instruments which may be needed by Forest Service personnel to determine when it is safe for them to carry out their firefighting function. Part of the training of these Forest Service people would be carried out by ARS. With this training, we will have a greatly increased capacity to assure wholesome meat products in event of an emergency.

FOOD MANAGEMENT PLANNING

The second major item on the attached list is for food management planning with an increase from $31,300 to $50,000. These increased funds are intended primarily to acquaint the food industry people with how food problems would be handled in an emergency. The Department of Agriculture expects that, to the maximum extent possible, it will continue to rely on industry to move food where it is needed in an emergency. USDA's job, as we understand it, would be only to help industry when normal sources of supply or normal markets are no longer available. However, these plans are of no value unless the people in the food industry are aware of how we plan to meet our responsibilities and what they should do. The additional funds requested should make it possible to add one person full time and another person part time to work with industry on these problems.

A new item in the 1963 USDA defense budget is for special defense surveys and analyses by the Economic Research Service. The work contemplated here involves making available certain data from the regular research work in a form especially useful in defense planning and in some cases collection of additional data that is needed in our defense work as a part of other surveys.

INFORMATION SERVICES

The $60,000 for the Federal Extension Service will be for use in the rural defense information and education program. This program carried out cooperatively with the Department of Defense is to advise people in rural areas of how to protect themselves, their crops, and their livestock in case of a nuclear attack and how they may better improve their chances for survival.

Mr. THOMAS. If you have the answer as to how to protect crops and livestock, we want it.

Please proceed.

Mr. REED. These funds will be used for special costs involved in preparation and distribution of information for the rural defense information and education program. It has been tentatively agreed with the Department of Defense that our work on the rural defense information and education program will be closely coordinated with their rural civil defense program and that they will finance the reproduction of bulletins and other materials needed by Agriculture in carrying out this phase of the overall civil defense and shelter program.

All of the funds allocated in the 1963 budget for the Agricultural Stabilization and Conservation Service would be for regional liaison representatives with OEP area and DOD regional offices. This amount of money will make it possible to have either four full-time or eight part-time representatives to work with DOD and OEP at their regional sites. This would be a reduction of about 50 percent in the funds and time allocated to this purpose as compared with 1961 and 1962. This tentative reduction in USDA representation at the area OEP-regional DOD offices reflects the reduced level of activity in these offices subsequent to the splitting up of OCDM. The Agricul-

tural Stabilization and Conservation Service will, out of their regular appropriations, continue the planning work at approximately the same level as has been the case for several years.

GENERAL ADMINISTRATION

The $52,000 item for general administration is to provide two men and their secretaries in the Office of the Secretary to coordinate defense planning activities. The increase reflects the fact that this Office was established only in November of 1962 with funds made available to Agriculture by OEP, and operated for only a part of a year. There would be no increase in the number of people in this office.

SOIL CONSERVATION AND FOREST SERVICE

No funds are included in our 1963 budget for the Soil Conservation Service and Forest Service activities in the defense area. Both agencies would, however, continue their rather extensive defense planning activities to the extent possible with regular appropriated funds. The Forest Service, as indicated earlier, carries out fire protection and timber management functions and the Soil Conservation Service has responsibility within Agriculture for determining the effects of fallout on land use under emergency conditions. Both of these agencies, with assistance from the Agricultural Research Service, are training their personnel in radiological monitoring in order to carry out their assignments. Instruments for this purpose are provided by the Department of Defense, and in the case of the Forest Service, the Department of Defense has indicated that it plans to make available funds from its appropriations for further research on the effects of fires caused by nuclear weapons.

APPROPRIATIONS AND FUNDS AVAILABLE FOR CIVIL DEFENSE ACTIVITIES

Mr. THOMAS. That is a very nice, understandable statement. We will insert your table in the record.

(The table referred to follows:)

Appropriations and funds available specifically for civil defense activities,[1] fiscal years 1961 and 1962, and budget estimate for 1963

Agency and purpose	Received by transfers from—				Budget estimate 1963	
	OCDM,[2] fiscal year 1961	Fiscal year 1962			Amount	Appropriation item
		OEP [3]	Department of Defense	Total [3]		
Agricultural Research Service:						
For radiological defense training	$22,111	$3,950	[5] $15,000	$18,950	$30,000	Meat inspection.
Research on food for shelters	19,822		[5] 100,000	100,000		
Agricultural Marketing Service:						
Food management planning	24,522	31,300		31,300	50,000	Marketing Research and Service.
Radiological defense training		1,500		1,500		
Economic Research Service: Special defense surveys and analyses					30,000	ERS, salaries and expenses.
Federal Extension Service: For rural defense information and assistance		48,660	[5] 15,000	63,660	60,000	Federal Extension Service.
Agricultural Stabilization and Conservation Service:						
Coordination and liaison at field level with OEP–DOD regional offices.	169,494	105,095	45,000	150,095	83,000	Acreage allotment and marketing quotas.
Agriculture defense resources planning		[4] 25,834		25,834		
Soil Conservation Service: Radiological defense training	30,000	10,000		10,000		
Forest Service: Radiological defense training	14,795	3,300		3,300		
General Administration: National defense planning and coordination		[4] 39,006		39,006	52,000	General administration.
Total	280,744	268,645	[5] 175,000	443,645	305,000	

[1] In addition, the agencies listed, as well as other Department agencies, participate in civil defense planning as an integral part of their regular program activities to the extent possible within their overall objectives and the funds available for carrying them out.

[2] Office of Civil and Defense Mobilization (OCDM) and Office of Emergency Planning (OEP).

[3] This excludes $128,000 from the Public Health Service and the Atomic Energy Commission for the project work on removing strontium from milk.

[4] Total of three items, $113,500, funds and personnel transferred, covered only 7 month of cost of functions delegated to Department pursuant to Executive Order 10958 ands Emergency Planning Order No. 1.

[5] Contracts with DOD for $30,000 additional funds to be used for information materials and $100,000 for research on food for shelters are about to be signed. Contracts for additional research on food for shelters and for research on food stocks may be negotiated and approved informally which would add about $100,000 more to this total.

JUSTIFICATION OF THE ESTIMATE

Mr. THOMAS. Mr. Reporter, put pages 2 through 5 in the record. (The pages referred to follow:)

Recapitulation of estimates

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(a) Radiological defense training and monitoring	$66,906	$33,750	$30,000	−$3,750
(b) Food management planning	24,522	31,300	50,000	+18,700
(c) Special defense surveys and analysis			30,000	30,000
(d) Rural defense information and assistance		63,660	60,000	−3,660
(e) Regional liaison	169,494	150,095	83,000	−67,095
(f) National defense planning and coordination		39,006	52,000	+12,994
(g) Defense resources planning		25,834		−25,834
(h) Research on food for shelters	19,822			
Total	280,744	343,645	305,000	−38,645

(a) *Radiological defense training and monitoring, $30,000*

The Department is responsible for supporting a nationwide monitoring system on radioactive fallout, and for minimizing the effects of radiological and other emergency hazards on the Nation's supply of meat and meat-food products. In the event of a national emergency, the postattack utilization of radiological information using established procedures, standards, and techniques will be essential to assure the safety and wholesomeness of these products for human consumption.

It is estimated that a continuing staff of approximately 2,000 ARS personnel should be trained to carry out the radiological monitoring responsibilities. The Service has approximately 750 personnel trained in the use of radiological monitoring equipment, including personnel qualified to serve as instructors. In order to assure the continued readiness of adequate monitoring services, it is necessary to train additional personnel as radiological monitors including replacement personnel. Approximately 400 ARS personnel assigned throughout the country at meat slaughtering and processing plants and livestock market centers in areas contiguous to these plants would be trained as radiological monitors in fiscal year 1963.

(b) *Food management planning, $50,000*

The Department of Agriculture has been delegated responsibility for emergency food management planning for radiological monitoring of certain foods. The current demand for this work is being financed from a limited allocation from the Office of Emergency Planning, and from regular funds of the Agricultural Marketing Service for civil defense activities which are an integral part of regular service programs. To keep pace with the increasing emphasis and tempo in the overall program for defense readiness, increased activity is needed to complete the development of plans for emergency management of food under conditions likely to exist following a nuclear attack. In addition, substantial training activity must be undertaken to acquaint field employees with the role they must carry out in such emergency period; and, finally, an orientation program must be undertaken to acquaint the food industry with emergency plans and industry emergency responsibilities. The amount requested provides for some of the increased attention needed in this work.

(c) *Special defense surveys and assistance, $30,000*

Economic research work dealing with the many rural economic aspects of the civil defense program is neded, including development of data and economic analyses on defense food distribution programs, food consumption, and other related economic problems.

Funds amounting to $20,000 would be used to continue economic research needed to carry out the national defense mobilization and defense readiness planning programs of the Department.

The American farmer needs every possible tool to help him in his fight to gain at least an even break in the marketplace. The development of effective farm programs requires that alternative proposals be evaluated in terms of their impact on farm output, farm prices and income, on food consumption, and on farm income. This in turn must be based on an accurate and comprehensive knowledge of the interrelationships between prices, demand and supply of the principal agricultural commodities, as well as long-run trends which are affecting the economic position of the farmer. Included also in these influences is the impact of the cold war and emergency preparedness measures to assure agricultural stability in the national emergency.

An estimated $10,000 would be needed to strengthen those economic research programs which are basic to the agricultural outlook, to program analysis, and to economic projections.

(d) Rural defense information and assistance, $60,000

National and regional leadership would be provided for special extension program activities in which specific agencies of both the Department of Agriculture and State land-grant colleges have a direct interest. Rural civil defense exemplifies this type of activity.

Personnel are needed to provide leadership and assistance to State extension services in planning, developing and coordinating State and regional programs in their areas of competency.

(e) Regional liaison, $83,000

The activities covered by this estimate which have been delegated to USDA relate to regional liaison in the development of area defense readiness plans and liaison between the Department of Agriculture, the Department of Defense, and the Office of Emergency Planning at the regional level. This pre-emergency liaison planning will help to assure prompt and effective results under a coordinated plan of action, by these key agencies in the event of a national emergency.

The Department's specific program responsibilities in this area include the assessment of effects of attack on agriculture, and of food requirements and supply, and the requesting of transportation, fuels, manpower, fertilizers, and other requisites necessary to enable the American farmer to continue to produce the needed food and fiber. In the fiscal year 1962, $150,095 has been provided for these activities by the Office of Emergency Planning. The $83,000 requested for 1963 is to finance these activities now assigned to the Department of Agriculture. In addition, the Agriculture Stabilization and Conservation Service will continue to carry out other necessary agricultural defense readiness planning as an integral and regular part of its regular program activities.

(f) National defense planning and coordination, $52,000

Additional staff assistance for the Secretary would be provided to enable him to furnish continuous and effective leadership and coordination within the Department and with other Federal agencies in matters of emergency preparedness. Involved are activities intended to assure adequate consumer information on available food resources in case of an atomic attack, guaranteeing contamination-free food supplies in any emergencies, and providing for uninterrupted leadership in the event of enemy attack.

The President by Executive Order 10958, dated August 14, 1961, and Executive Order 10998, dated February 16, 1962, delegated to the Secretary of Agriculture certain functions respecting the stockpiling of emergency food supplies. These are in addition to the responsibilities of the Secretary for defense preparedness planning of the regular programs of the Department. The responsibilities of the Secretary would include:

(1) Providing leadership and initiative in the formulation of plans for carrying out emergency preparedness activities of the Department as they relate to food and agriculture.

(2) Coordinating and expediting the application of resources of the Department agencies in assisting Federal, State, and local organizations in defense planning of emergency food supply requirements analysis and standby plans.

(3) Maintaining liaison with appropriate Departments and agencies of the executive branch to assure coordinated effort in utilization of available resources, providing adequate information on available food and other agricultural resources, and guaranteeing contamination-free food supplies.

(4) Cooperating in research with Federal agencies as it pertains to chemical, biological, and radiological defense activities.

(5) Cooperating with States and other Federal agencies in rural fire defense.

(6) Conducting a rural information program to aid rural people in protection against the results of an enemy attack; and

(7) Planning for the continuity of the Department's essential activities in the event of an emergency.

The formulation of policies and program relating to the USDA's defense planning responsibilities would be carried out by two technical people who would be Assistants to the Secretary, and who would provide overall coordination and direction of defense activities, to assure continuity of planning and implementation of the Department's civil defense activities throughout the country. Action would be taken on various matters of policy interpretation and development in the area of defense planning.

FUNDS APPROPRIATED TO USDA IN PREVIOUS YEARS

Mr. THOMAS. It shows a decrease of $38,645 from 1962, giving you $305,000.

At this time read into the record the appropriations of the Department of Agriculture for this same service from 1955 through 1962. Can you read those figures into the record at this point?

Mr. WALTER. We do not have them with us. There was no direct appropriation to the Department of Agriculture, sir, on these items.

Mr. THOMAS. For years you did not request any funds but you have had some for the last 5 or 6 years. For whatever years you have had funds, can you read them into the record?

Mr. WALTER. May we supply them?

Mr. THOMAS. Do you have them now?

Mr. WALTER. No, sir.

Mr. THOMAS. Do you know what you had in 1960 and 1961?

Mr. WALTER. Yes, sir.

Mr. THOMAS. What did you have in 1960?

Mr. WALTER. I do not have that figure here, sir.

(The information requested is estimated, $346,600 for the fiscal year 1960.)

USDA PERSONNEL ENGAGED IN CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. Referring to the fund of $305,000, how many jobs will that supply for you?

Mr. WALTER. There will be four people under General Administration.

Mr. THOMAS. Add them all up. What is the total?

Mr. WALTER. Approximately 19 in fiscal 1963, as near as we can give it to you. We will supply a breakdown of employment for 1961, 1962, and 1963.

(The information referred to follows:)

Employees paid out of Civil Defense funds

[Man-years]

Agency	Fiscal year 1961	Fiscal year 1962 (preliminary)	Fiscal year 1963 (proposed)
Agricultural Research Service: Research on food for shelters	2	6	0
Agricultural Marketing Service: Food management planning	2	2	4
Federal Extension Service: Rural defense information and assistance	0	1	3
Agricultural Stabilization and Conservation Service: Regional liaison representatives and planning work	16	18	8
Office of the Secretary	0	4	4
Total	20	31	19

Mr. THOMAS. How many people have you had working in this field in the Department of Agriculture for the last 7 or 8 years, whether or not they have been paid directly with appropriated funds, either by the old OCDM or any of its successor or predecessor agencies, or paid directly with agricultural funds?

Mr. WALTER. This is very difficult to say for the simple reason that we have many, many people spending just a few hours a week or a month on this work.

Mr. THOMAS. How long has the Department been working in this particular field of fallout?

Mr. WALTER. I have not been on that particular phase but I believe it is probably 10 years, sir.

AGRICULTURAL RESEARCH

Mr. EVINS. Mr. Chairman, I think our farm people are deserving of protection of fallout as much as anybody. I wonder, as you do, how are you going to protect poultry and livestock against the hazards of fallout? What are you doing? The committee has been told that cattle and livestock would be destroyed and there can be no salvage. You tell us that it is possible it can be done.

What are you doing? How are you doing it?

Mr. REED. On that particular end of it, we have done considerable research. For instance, we have developed in the field of milk, sir, a method by which strontium 90 can be removed from milk, and that indirectly relates to a fallout.

Mr. EVINS. In your overall agricultural research appropriation request I note you have sums funded for that purpose for research. Would that take care of it?

Mr. REED. This is not included in the regular research funds.

Mr. THOMAS. May I interrupt you there?

Mr. EVINS. Yes.

Mr. THOMAS. I think it has been testified by some experts from OEP that if you were to have an attack on this country and you would have a bombload five times all the bombs that have been exploded in the world as of today, the strontium 90 would not be sufficient to be of any concern.

Mr. EVINS. How are the agriculture departments getting the information out of the Department to the county agent and from there to the farmers?

Dies it lie around in the offices of the headquarters and really never get out to the people? Are they doing anything about it? Are they being alerted about it? Are they advised or informed? Are you getting the program over? You have these studies. You have these booklets printed. Do these get in the hands of the farmers and do they act on it?

Mr. REED. Yes, sir. I would like to submit for the record the Secretary's memorandums 1489 and 1490. We have what we think is a unique capability in the Department of Agriculture to get information to farmers. In each of the 3,000 counties we have organized a USDA Defense Board that is made up of the county agent and the county office manager of the Agricultural Stabilization and Conservation Service, as the chairman, and it is made up of all the other agricultural agencies that operate in the county. At the State level we have a USDA State Defense Board, made up of all the agencies represented at the State level. In Washington we have the members of each, or the Directors or Administrators of each of the principal agencies making up a USDA National Defense Board under my direction.

All of these assignments on defense are made direct to the agency that is closest to its peacetime assignment. As my figures show here, which I will also give you for the record, the charges on civil defense and defense mobilization activities for the fiscal year 1961–62, out of the regular appropriations of the Department, run around $900,000 in 1961 and $950,000 in 1962. This is over and above what we were assigned from these other groups.

We have a direct line, sir, down to the USDA State Defense Board and to the county. We think we measure capability to get information to farmers on the basis of these county board or local organizations that are able to operate in a cutoff situation.

Mr. EVINS. I think you have a good organization.

(Secretary's momorandums Nos. 1489 and 1490 follow:)

(Secretary's memorandum No. 1489)

ASSIGNMENT OF DEFENSE RESPONSIBILITIES IN USDA

SECTION 1—GENERAL

1. Purpose

This memorandum outlines the defense responsibilities of the Department of Agriculture and the organization for carrying them out at the National, regional, State, and county levels. It establishes responsibility for departmental direction and coordination, and assigns major defense functions to USDA agencies doing related work, so as to build full capability into existing organization. Other defense assignments may be made from time to time. Defense responsibilities will be regarded as equal in importance to regular programs and activities.

2. Summary of USDA defense responsibilities

The Department of Agriculture has been delegated defense program responsibilities relating to:

(*a*) Processing, storage, and distribution of food from the farm through the wholesaler level;

(*b*) Food production on farms;

(*c*) Domestic distribution of farm equipment and fertilizer;

(*d*) Use of facilities associated with food production, processing, storage, and distribution and domestic distribution of farm equipment and fertilizer;

(*e*) Salvage of food and rehabilitation of food facilities;

(*f*) Stockpiling of food;

(*g*) Protection of crops, livestock, and products thereof from biological and chemical warfare;

(*h*) Purity and wholesomeness of livestock, meat and meat products, poultry and poultry products in establishments subject to USDA inspection and commodities owned by the Commodity Credit Corporation or the Secretary;

(*i*) Research on matters relating to defense;

(*j*) Defense information and education program;

(*k*) Emergency credit;

(*l*) Rural fire defense and timber production, including production and utilization of forest products;

(*m*) Emergency use of soils and water;

(*n*) Agricultural statistics relating to defense;

(*o*) Radiological defense for agricultural purposes;

(*p*) Assessment of effects of attack on assigned resources;

(*q*) Claiming manpower, equipment, supplies, and services needed to support food and other program responsibilities;

(*r*) Analyzing food requirements and supplies;

(*s*) Cooperation with the Office of Emergency Planning on economic stabilization and rationing policies.

SEC. 2—RESPONSIBILITIES AT NATIONAL HEADQUARTERS

3. Direction, coordination, and liaison

(*a*) The Special Assistant to the Secretary of Defense (referred to hereafter as Special Assistant) is responsible to the Secretary for directing the total defense planning program of USDA. This includes maintaining liaison with executive departments and the Congress with respect to policy matters, supervision, and direction of USDA National, State, and county defense boards and USDA regional liaison representatives and providing policy guidance to USDA agencies in carrying out specific defense assignments. In an emergency, the Special Assistant would serve as a principal staff assistant to the Secretary for defense matters including estimating effects of the emergency and serving as claimant for requisites for the food and other USDA programs.

(*b*) *USDA National Defense Board.*—A USDA National Defense Board made up of the heads of agencies with major defense assignments has been established to provide help and counsel as may be required by the special assistant on defense in directing and coordinating the defense work of the Department. This Board will also assume responsibilities of the former Secretary's Defense Policy Committee and in an emergency will advise the Secretary on defense matters. Members of the Board as heads of their agencies will be responsible for carrying out the preemergency defense planning and providing technical direction to agency representatives in the field as needed to carry out the departmental program.

4. Agricultural marketing service

The Agricultural Marketing Service is responsible for preemergency planning and emergency operations relating to management of food supplies from the time they leave the farm through the wholesaler level and covering—

(*a*) Analysis of food processing, storage, and distribution capability;

(*b*) Control and other actions relating to food processing, storage, and distribution through the wholesaler level and the direct procurement of food as necessary under emergency conditions, including use of related facilities;

(*c*) Market quality and transportation and facilities research on matters related to AMS defense responsibilities;

(*d*) Salvage programs for food and rehabilitation of food facilities at and above the wholesale level except on farms;

(*e*) Inspection and grading of agricultural commodities and inspection for purity and wholesomeness of poultry and poultry products in plants subject to USDA inspection;

(*f*) Assistance to food processing, storage, and distributing industries including determination of their requirements for manpower, equipment, supplies, services, and credit;

(*g*) Claiming food for the civilian population;

(*h*) Analyzing food requirements in relation to supply and recommending basic food allocations to major food claimants;

(*i*) Advising the food industry of USDA plans for postattack food management;

(*j*) Radiological monitoring at assigned fixed monitoring stations and in poultry-processing plant subject to AMS inspection and for agricultural commodities owned by the Commodity Credit Corporation or USDA (except those stored on farms, ranches, or at bin sites);

(*k*) Planning and carrying out in the preemergency period programs relating to stockpiles of processed foods and the management of such stockpiles in the emergency period.

5. Agricultural Research Service

The Agricultural Research Service is responsible for preemergency planning and emergency operations covering—

(*a*) Defense against biological and chemical warfare in relation to crops, livestock, and products thereof and determination of the extent and effects of biological and chemical warfare agents employed by the enemy on agriculture;

(*b*) Inspection to insure the purity and wholesomeness of livestock, meat, and meat products in slaughtering and processing plants subject to continuous inspection of ARS;

(*c*) Research in support of defense planning and anticipated emergency operations except as noted under "Agricultural Marketing Service," "Economic Research Service," and "Forest Service."

(*d*) Information and advice concerning equipment, chemicals, and other requisites needed in support of the assigned activities.

The Agricultural Research Service is also responsible for preemergency planning and operations and emergency operations relating to organizing, equipping, and directing a system of radiological monitoring.

ARS is responsible for all administrative functions on behalf of the Secretary relating to radiological safety within the Department. The ARS arranges with the Office of Civil Defense of the Department of Defense for the acquisition, use, and disposition of monitoring equipment. ARS arranges with OCD and by other means for the training of instructors in the use of monitoring equipment; gives general assistance to agencies of the Department in the training of monitors; develops and formulates the guidelines for use in determining the most efficient rehabilitation of affected agricultural lands and commodities; and coordinates radiological training and research within the Department and with OCD.

The radiological monitoring system includes assignments of responsibility to ARS for manning assigned Federal fixed monitoring stations and for maintaining a capability to monitor at meat slaughtering and processing plants and stockyards subject to continuous ARS inspection.

6. Agricultural Stabilization and Conservation Service

The Agricultural Stabilization and Conservation Service is responsible for preemergency planning and emergency operations relating to production on farms of crops and livestock and the following related activities:

(*a*) Production goals and food production program actions involving use of production facilities;

(*b*) Programs for handling and storage of food on farms;

(*c*) Assistance to farmers including determination of requirements for manpower, equipment, supplies and services, and administering actions relating to the domestic distribution of farm equipment, feed, seed, and fertilizer;

(*d*) Developing a program for domestic distribution of farm equipment, feed, seed, and fertilizer including use of related facilities;

(*e*) Programs for salvaging of food on farms and rehabilitation of facilities on farms and farm land;

(*f*) Planning and carrying out in the preemergency period programs relating to the management and stockpiling of CCC-owned commodities.

The following additional functions will be performed by ASCS as a coordinating service for the Special Assistant:

(*g*) Consolidation of all claims for manpower, equipment, supplies and services needed to support food and other program responsibilities of USDA and day-to-day contacts with resource agencies of Government;

(*h*) Cooperation with the Office of Emergency Planning on economic stabilization and rationing policies;

(*i*) Servicing USDA State and county defense boards and USDA regional liaison representatives;

(*j*) Coordinating activities relating to damage assessment and assessment of attack effects on food and related facilities and other resources that are USDA responsibilities;

(*k*) On assignment, coordinate defense activities of agencies of USDA.

7. Cooperative Extension Service

The Cooperative Extension Service is responsible for preemergency planning and operations and emergency operations covering:

(*a*) Information to farmers and the food industry concerning their role in an emergency and educational assistance in reducing vulnerability of homes, crops, and livestock to either covert or overt attack;

(*b*) Maintaining close working relationships with civic organizations and other local groups and information media to obtain understanding and support of USDA defense activities and support of responsibility included in (*a*) above;

(*c*) Information and education services essential to carrying out the defense programs of USDA;

(*d*) Information and education services essential to application of science and technology to meet emergency agricultural production goals.

8. Economic Research Service

The Economic Research Service is responsible for conducting appropriate research to support defense planning and emergency operations. This will include analysis of food production resources and their capabilities and potential demand for food.

9. Farmers Home Administration

The Farmers Home Administration is responsible for preemergency planning and emergency operations covering:

(*a*) Emergency credit to farmers in support of the food production program;

(*b*) Technical assistance relating to guarantees and other credit arrangements for food processors and distributors in support of the food management program.

10. Foreign Agricultural Service

The Foreign Agricultural Service is responsible for preemergency planning and emergency operations relating to:

(*a*) The acquiring and analysis of information related to food and agricultural commodities on a worldwide basis by commodities;

(*b*) In cooperation with the Department of State the assembling and analyses of food requirements for foreign allies and making recommendations regarding allocations;

(*c*) Export controls under the Export Control Act, and import controls of agricultural commodities;

(*d*) Support of the activities of international defense organizations, such as NATO and SEATO and their respective suborganizations concerned with food and agriculture whether carried on in this or other countries.

11. Forest Service

The Forest Service is responsible for preemergency planning and emergency operations covering:

(*a*) Prevention and control of fires in rural areas caused by effects of enemy attack (in cooperation with State government and appropriate Federal agencies) and determining damage to national forests and other forested areas resulting from enemy attack;

(*b*) Emergency protection, management, and utilization of national forest timber, range, water, and related resources:

(*c*) Emergency production, availability, and utilization of timber and timber products;

(*d*) Information and advice concerning equipment, manpower, fuels, chemicals, and other requisites needed for carrying out the assigned activities;

(*e*) Monitoring for fallout at designated fixed monitoring stations and on land within national forest boundaries and all State or privately owned forest and range land protected by the Forest Service under cooperative agreement;

(*f*) Research in support of defense planning and emergency operations relating to management, and utilization of forest resources and defense against rural land fires.

12. Office of Budget and Finance

The Office of Budget and Finance is responsible for preemergency plans and emergency operations for the budgeting and financing of both administrative and program activities.

13. Office of General Counsel

The Office of General Counsel is responsible for advice and assistance on legal aspects of food orders, and other proposed defense actions in preemergency and emergency periods.

14. Office of Information

The Office of Information is responsible for defense information services at the national level in preemergency and emergency circumstances and for providing advice regarding proper use of informational media in the field.

15. Office of Personnel

The Office of Personnel is responsible for preemergency planning and emergency activities relating to employee survival actions, assistance in staffing emergency groups within the Department and in developing procedures for recruiting and appointing personnel under postattack conditions.

16. Office of Plant and Operations

The Office of Plant and Operations is responsible for preemergency planning and emergency activities relating to office space for employees, office equipment and supplies, reproduction of material, coordination of employee transportation, communications, and other administrative services essential under emergency conditions.

17. Soil Conservation Service

The Soil Conservation Service is responsible for preemergency planning and emergency operations relating to effects of fallout on land use, and the availability and proper use of soils and water under emergency conditions. SCS will also monitor fallout at designated fixed monitoring stations and make necessary plans to monitor agricultural lands and water postattack and advise on safety for livestock. It will also make necessary plans for postattack monitoring of farm commodities stored or harvestable on farms, ranches, and at bin sites.

18. Statistical Reporting Service

The Statistical Reporting Service is responsible for obtaining and supplying agricultural statistics necessary to support defense planning and emergency operations.

19. Agency coordination, organization, and staffing

(*a*) *Coordination.*—Each USDA agency or office with a defense assignment will coordinate its responsibility with related responsibilities of other USDA agencies or offices.

(*b*) *Emergency organization and staffing.*—The head of each agency or office given a defense assignment will consider the internal organization and staff which he would need in an emergency to carry out his assigned area of responsibility at the headquarters level. This organization will conform as nearly as possible to existing organization and existing organization units will be used whenever possible for defense planning.

(c) *Assistance to agencies.*—Where existing units appear to be insufficient to carry out defense assignments, the responsible agency will work out arrangements for either setting up defense planning committees or utilizing staffs of other agencies to perform the necessary defense functions. The special assistant will continuously evaluate emergency functions of USDA agencies in order to determine priorities for emergency assignments to USDA personnel.

(d) *Approval of emergency organization plans.*—When adaptations of current organization to meet an emergency have been worked out, they shall be submitted to the special assistant for approval.

SECTION 3—RESPONSIBILITIES AT THE REGIONAL LEVEL

20. USDA regional liaison representative and staff

At the regional level, the USDA has eight regional liaison representatives—one in each of the eight regions. Each RLR is assisted by representatives of the following agencies:

(a) Agricultural Marketing Service
(b) Agricultural Stabilization and Conservation Service
(c) Agricultural Research Service
(d) Cooperative Extension Service
(e) Farmers Home Administration
(f) Forest Service
(g) Soil Conservation Service

21 Preemergency planning

Each USDA RLR is responsible for:

(a) Maintaining liaison with the Office of Emergency Planning, Department of Defense and other agencies of Government at the regional level;

(b) Keeping USDA representatives in the field and at national headquarters informed;

(c) Developing defense plans for carrying out assignments at the regional level;

(d) Assisting in servicing the chairmen of USDA defense boards at the State level.

22. Emergency responsibilities

In an emergency, each USDA RLD will be responsible to an appropriate official at the national level for:

(a) Liaison with DOD and other agencies of Government at the regional level;

(b) Claiming necessary manpower, equipment, supplies, and services needed to support essential USDA functions at the regional level;

(c) Keeping USDA representatives in the field and at national headquarters informed;

(d) Working with the chairmen of USDA State defense boards.

If communications with higher authority are cut off, each USDA RLR is responsible for providing policy direction for all USDA programs in his region until communications are restored. This includes policy direction to chairmen of USDA State defense boards.

SECTION 4—RESPONSIBILITIES AT THE STATE LEVEL

23. USDA State defense boards

The USDA has a USDA State defense board in each State, plus one covering Puerto Rico and the Virgin Islands. Membership of each board includes a representative of each of the following agencies:

(a) Agricultural Marketing Service
(b) Agricultural Stabilization and Conservation Service
(c) Agricultural Research Service
(d) Cooperative Extension Service
(e) Farmers Home Administration
(f) Forest Service
(g) Soil Conservation Service
(h) Statistical Reporting Service

Where there is a shortage of qualified personnel, agencies may arrange for personnel of other agencies to represent them on USDA State defense boards. If such an arrangement is needed, the national offices of the agencies involved shall be requested to approve the proposed assignments. The chairman of the USDA State defense board is generally the ASCS State executive director, who also represents ASCS on the board. The ASCS State office will provide supporting services, such as typing, filing, reproduction, and mailing for the board.

24. Preemergency planning

The chairman of the USDA State defense board, under direction of the special assistant, is responsible for:

(*a*) Maintaining liaison with the USDARLR and State defense organization and other appropriate agencies and officials at the State level;

(*b*) Developing with his State board an adequate organization and staff to carry out USDA responsibilities at the State level in event of emergency;

(*c*) Developing program plans at the State level covering assessment of attack effects; food requirements and allocations, claimancy for manpower, equipment, supplies and services;

(*d*) Coordinating and guiding defense planning by representatives of each USDA agency at the State level in accordance with assignments listed in section 2 above;

(*e*) Supervising and directing defense planning by chairmen of USDA defense boards at the county level;

(*f*) Collecting and reporting data needed to support defense planning.

25. Emergency responsibilities

In an emergency, the chairman of the USDA State Defense Board will be responsible, under direction of an appropriate official at the national level, for administering all USDA programs at the State level. This will include:

(*a*) Maintaining liaison with the USDA regional liaison representatives, and representing USDA in relations with State government officials and with representatives of other appropriate agencies at the State level;

(*b*) Obtaining attack data and coordinating assessment of effects of attack;

(*c*) Determining food requirements and supply situation;

(*d*) Claiming necessary manpower, equipment, supplies, and services from control authorities;

(*e*) Directing and coordinating activities of the various USDA agency representatives at the State level in accordance with assignments in section 2 above;

(*f*) Directing the activity of the chairmen of the USDA county defense boards.

The chairman will be assisted by other members of the board and by the additional staff designated in the preemergency period. When communications with USDA national headquarters are cut off, the chairman of the USDA State defense board will seek policy guidance from the RLR. Failing this, the chairman of the USDA State defense board has authority to make all necessary program decisions.

SEC. 5—RESPONSIBILITIES AT THE COUNTY LEVEL

26. USDA county defense board

The USDA has a county defense board in each county, except for metropolitan areas or other special situations. Membership of each board includes, where available, a representative of the following agencies:

(*a*) Agricultural Stabilization and Conservation Service

(*b*) Coooperative Extension Service

(*c*) Farmers Home Administration

(*d*) Soil Conservation Service

Where possible, representation from Agricultural Research Service and Forest Service will be provided. In a metropolitan area it will usually be possible for an AMS representative to serve on the board. Where there is a shortage of qualified personnel, agencies may arrange for personnel of other agencies to represent them on USDA county defense boards. If such an arrangement is made, the chairman of the USDA State defense board will be notified. Except in certain metropolitan areas or other special situations, the chairman of the USDA county defense board is the ASCS county office manager, who also serves

as ASCS representative on the board. The ASCS county office will provide supporting services such as typing, filing, reproduction, and mailing for the board.

27. Preemergency planning

The chairman of the USDA county defense board, under direction of the chairman of the USDA State defense board, is responsible for:

(*a*) Maintaining liaison with the county government defense organization and other officials in the county as necessary;

(*b*) Developing with his county board an adequate organization and staff to carry out USDA responsibilities at the county level in event of an emergency;

(*c*) Developing program plans covering assessment of effects of attack, food requirements and supply analysis and claiming nonfood requisites;

(*d*) Coordinating and guiding the planning done by representatives of each USDA agency at the county level in accordance with assignments listed in section 2 above;

(*e*) Collecting and reporting data needed to support defense planning.

28. Emergency responsibilities

In an emergency, the chairman of the USDA county defense board will be responsible to the chairman of the USDA State defense board for the following functions, when communications are intact:

(*a*) Maintaining liaison with county government and other officials at the county level;

(*b*) Obtaining attack information and coordinating assessment of effects of attack;

(*c*) Coordinating development of food requirements and supply data;

(*d*) Claiming nonfood materials and manpower;

(*e*) Directing and coordinating activities of USDA agency representatives in the county, in accordance with assignments listed in section 2 above.

In an emergency, when communications with higher authority are cut off, the chairman of the USDA county defense board has authority to make all necessary program decisions.

SEC. 6—SUPERSEDENCE OF EXISTING DIRECTIVES

29. Superseded documents

This memorandum supersedes and cancels the following documents:

(*a*) Statement of June 1960 entitled "Defense Mobilization Planning to Assure Continuity of Essential Functions in Event of Civil Defense Emergency" and related Secretary's Memorandum No. 1443 of July 15, 1960;

(*b*) Memorandum (classified) of December 1959, relating to assignments of defense responsibilities to officials of USDA at the national level;

(*c*) Secretary's Memorandum 1346 of March 3, 1954, entitled "Assignment of Defense Mobilization Functions Within the U.S. Department of Agriculture and Related Delegations of Authority" and supplements to Secretary's Memorandum 1346;

(*d*) Secretary's Memorandum No. 1350 of March 30, 1954, entitled "Activities Under the Federal Civil Defense Act of 1950 as Amended";

(*e*) Secretary's Memorandum No. 1376 of April 20, 1955, entitled "Implementation of Defense Mobilization and Civil Defense Responsibilities" and its supplements;

(*f*) Secretary's Memorandum No. 1427 of August 26, 1958, entitled "Liaison and Coordination of Defense and Civilian Mobilization Activities";

(*g*) Secretary's Memorandum No. 1430 of May 22, 1959, entitled "Responsibilities for Radiological Monitoring";

(*h*) Secretary's Memorandum No. 1437 of January 18, 1960, entitled "USDA Regional Liaison Representatives";

(*i*) All USDA emergency organization charts (classified and otherwise) which were in existence prior to the date of this memorandum.

30. Review of other documents

Each official of USDA given responsibility by this memorandum will examine the defense documents which he or his predecessor has issued. Any which are inconsistent with provisions of this memorandum will be canceled or updated.

CHARLES S. MURPHY,
Acting Secretary.

(Secretary's memorandum No. 1490)

ESTABLISHMENT OF USDA NATIONAL DEFENSE BOARD

To further implement the defense readiness of the Department of Agriculture at the national level, there is hereby established a USDA National Defense Board. The Board will be chaired by, and will advise and assist, the Secretary's Special Assistant on Defense in carrying out defense and related emergency assignments of the Department. The Board also will assume responsibilities of the former Secretary's Defense Policy Committee and, in an emergency, will advise the Secretary on defense matters. Membership of the Board will be: Robert S. Reed, Chairman, Office of the Secretary; Horace D. Godfrey, Agricultural Stabilization and Conservation Service; Sylvester R. Smith, Agricultural Marketing Service; Byron T. Shaw, Agricultural Research Service; E. T. York, Federal Extension Service; Howard Bertsch, Farmers Home Administration; Richard E. McArdle, Forest Service; R. Lyle Webster, Office of Information; Donald A. Williams, Soil Conservation Service; Harry C. Trelogan, Statistical Reporting Service; John C. Bagwell, Office of the General Counsel.

The Board will assist in the review and appraisal of agency defense assignments, and will provide other help and counsel as may be required by the Special Assistant on Defense in directing and coordinating the defense work of the Department.

CHARLES S. MURPHY, *Acting Secretary.*

EDUCATIONAL MATERIAL ON CIVIL DEFENSE

Mr. EVINS. My question was directed to how do you get the information to the farmers themselves? We have said there is a lack of alertness, lack of concern of civil defense by the population generally. If they are not concerned in the cities, certainly they are not concerned on the farms. How do you get it to the farmers?

Mr. REED. We get it to the farmer primarily, through the agricultural county agent. I used to be one. I know how that is done. I am from your neighboring State of Kentucky. We have a number of publications and we have planned a number of fiilms and bulletins and educational materials on civil defense. We feel it is just as important to get such information out to the rural area as it is to inform people in the urban areas of the country. We have a tentative agreement with the Department of Defense that we will develop these rural information pieces, that they will pay for the editing of them and printing, costs of the films, et cetera.

Mr. EVINS. Mr. Reed, I represent 23 rural counties, all agricultural counties, from Kentucky to the Alabama line and I am not really aware of too much activity or concern in civil defense in the farm field.

Mr. REED. I would have to agree to you. Up to the present, although we have spent some 10 years on it, we have not progressed as far as we should be, by any means.

Mr. EVINS. Thank you.

RADIOLOGICAL DEFENSE TRAINING AND MONITORING

Mr. JONAS. I do not find anything in this justification except a lot of generalities. You do not tell us how you are going to spend this money. You throw it all in here in a lump. You list food management planning, $50,000. What are the objects? What are you going to spend that money for and how? You say you will have only 19 positions. How much are you going to spend on travel and all of the other things that you probably will spend some of it on?

Just take that first item, for example, $30,000, radiological defense training and monitoring. How are you going to spend that?

Mr. WALTER. Nearly all of this $30,000 will be for paying the travel expenses of the people who are doing this training work. Their salaries are not included here. There would be some training materials included in that item.

Mr. JONAS. You mean you have travel and printing?

Mr. WALTER. In this particular item you mentioned, radiological defense training and monitoring, most of the funds would be for training materials and travel.

Mr. JONAS. How much would be for travel?

Mr. WALTER. I do not believe we have a breakdown between those, sir.

BASIS FOR PREPARATION OF THE BUDGET

Mr. JONAS. Another thing that intrigues me about this justification, you have got all of these rounded off figures in it. You are going to spend an even $30,000 on this, an even $50,000 on food management planning, an even $30,000 on special defense surveys. Don't you ever deal with cents? Do you only deal with dollars? They come out even in every case.

Mr. REED. I think there is a valid explanation for that, sir. The original request of the Department of Agriculture was considerably in excess of this and we were assigned a figure.

Mr. JONAS. An overall figure and you broke it down into these different elements?

Mr. REED. Yes, sir.

Mr. JONAS. They gave you $305,000 and you just divided it out to come out even?

Mr. REED. We divided it out in the proportion of the original request with some judgment but there was no need of carrying cents in that type of a division.

Mr. JONAS. On page 3 I read the last paragraph and the first two sentences at least sound to me as if you are justifying a regular Department of Agriculture budget request. I quote the first sentence:

> The American farmer needs every possible tool to help him in his fight to gain at least an even break in the marketplace.

What does that have to do with radioactivity, atomic attacks, et cetera? That is what the Department of Agriculture is doing, is it not? That is its main job. You say:

> The development of effective farm programs requires that alternative proposals be evaluated in terms of their impact on farm output, farm prices, and income, on food consumption, and on farm income.

Isn't that the primary function of the Department of Agriculture now?

Mr. REED. Yes, sir, it is.

Mr. JONAS. Why do you not do this with your regular budget?

Mr. REED. This refers to special surveys of the economic research work that are related directly to defense. This paragraph seems to apply to the whole activity of that particular agency.

REGIONAL LIAISON WORK

Mr. JONAS. There is one other item. I see you have a pretty large reduction in your liaison work.

You only want to spend $83,000 on that. You are spending $150,095 this year. I would like to congratulate you on reducing it, but it looks to me as if you will need more liaison and less research. You have been researching for years. Now you are cutting down on your coordinating activities. Isn't that making the cut at the wrong place?

Mr. REED. Well, it could be. We had the full salaries of eight grade 14 regional liaison representatives provided by the Office of Emergency Planning and the Department of Defense for this fiscal year. That called for a grade 14 and a secretary at each of these eight points where the Department of Defense and OEP have a regional office. Because of a reduction in the funds that were available, we had to terminate four of the eight, about January 1 of this year. This budget would continue the present situation in which we have four full-time regional liaison representatives and four who have regular assignments in other agencies, who are now doing this liaison work as a part-time measure.

Mr. JONAS. Thank you.

Mr. THOMAS. Thank you, Mr. Reed, you and your very capable staff. You are always most helpful. We are for the Agriculture Department. You do a fine job. Thank you and come back to see us.

DEPARTMENT OF COMMERCE

WITNESSES

WILLIAM RUDER, ASSISTANT SECRETARY FOR ADMINISTRATION AND PUBLIC AFFAIRS
EUGENE P. FOLEY, ADMINISTRATOR, BUSINESS AND DEFENSE SERVICES ADMINISTRATION
WILLIAM I. MERKIN, DIRECTOR, OFFICE OF ADMINISTRATION, BUSINESS AND DEFENSE SERVICES ADMINISTRATION
OSCAR H. NIELSON, DIRECTOR, OFFICE OF BUDGET AND MANAGEMENT
FRANK BARTON, DEPUTY UNDER SECRETARY FOR TRANSPORTATION

Mr. THOMAS. Gentlemen, we have with us our friends from the Department of Commerce. We have Mr. William Ruder, Assistant Secretary for Administration and Public Affairs; Mr. Foley, Administrator, Business and Defense Services, and Judge Oscar Nielson, the "Rock of Gibraltar." He has been with us for years and years. The indications are he will be here 30 or 40 more.

Mr. NIELSON. I would not say that.

Mr. THOMAS. We have Mr. Craig, Acting Emergency Planning Coordinator. Welcome aboard. Do you have a statement for us, Mr. Ruder?

Mr. RUDER. Yes, sir. I do have a brief statement.

Mr. THOMAS. If you will summarize it, it might save everybody's time. We will put whatever you want to in the record.

General Statement

Mr. Ruder. Mr. Chairman and members of the committee, the appropriation estimate of the Department of Commerce for fiscal year 1963 contains a total of $2,800,700 to carry out certain of the civil defense and mobilization responsibilities which have been delegated to the Department. These are included in Executive Order 10999, approved February 17, 1962, which charges the Secretary of Commerce with the responsibility for preparation of national emergency plans and the development of preparedness programs. In addition to the Office of the Secretary, that affects the Bureau of the Census, the Business Services Administration, the Maritime Administration, and the Weather Bureau.

In order to conserve the time of the committee, Mr. Chairman, I should like to confine my statement to brief comments regarding the requests for these functions in the 1963 estimate.

Office of the Secretary

The additional amount of $175,000 is proposed to provide the Under Secretary for Transportation with 14 positions to assist in carrying out newly delegated responsibilities for the development of long-range plans for integrating the mobilization requirements of all forms of commerce with all national and international transportation systems. We are proceeding to develop initial plans for this activity within the limitations of our 1962 budget.

The Office of the Emergency Planning Coordinator is responsible at the departmental level for the initiation, development, coordination and testing of civil defense and defense mobilization plans of the Department. Additional funds in the amount of $8,360 are requested to fill two secretarial vacancies in the field and to provide travel money to the eight regional coordinators.

The Defense Air Transportation Administration plans the mobilization of civil resources to insure that air transportation facilities will be adequate and effectively used in time of war. An increase of $1,000 is requested to enable professional staff personnel to perform necessary travel.

Bureau of the Census

The Bureau of the Census program provides statistical support for the National Resource Evaluation Center, the updating of census records relating to critical manufacturing plants, planning for a postattack population survey, computation of surface area of each of the standard geographic locations included in the national location code. An increase of $146,000 is needed for more adequate provision of these services.

Business and Defense Services Administration

The Business and Defense Services Administration is responsible for the production resources of the Nation in the event of national emergency. It currently administers a system of priorities and allocations authority which assures completion of current military and

atomic energy and space programs of production and construction. No increase is requested for 1963.

In addition to title I of the Defense Production Act, which includes the system of priorities, the following responsibilities have been redelegated to the Administrator of the Business and Defense Services Administration:

The development of estimates of mobilization requirements for stockpile materials.

The continuation and expansion of the BDSA executive reserve program.

Further, there are other programs in the industrial mobilization field which the President desires to support, such as an active resources planning activity to complement the increased civil defense program.

We regard these responsibilities as an intrinsic program for the Business and Defense Services Administration and the funds we are requesting are necessary to fulfill these obligations.

MARITIME ADMINISTRATION

The defense mobilization planning for port systems and facilities will be carried out at the same level as in 1962 with no requested increase in personnel. This program is based on development of plans for control of traffic through port areas, administration of priorities for the movement of such traffic allocation of available ports and facilities, assessment of potential or actual enemy bomb damage, maintenance of a national inventory of port facilities, and related mobilization readiness planning. An additional amount of $7,900 is requested to provide for amortization of personnel costs and minor increases in travel, printing, and services to be provided by other agencies.

WEATHER BUREAU

The Weather Bureau's program in support of defense mobilization planning activities is concerned principally with the preparation and dissemination of fallout forecasts. No increase is requested for this program in fiscal 1963.

I am pleased to have had this opportunity to appear before your committee on the matter of our mobilization program. Bureau representatives are standing by to answer any specific questions the committee may wish to ask concerning this program.

Mr. EVINS. Thank you, Mr. Ruder. That is a very precise and very much to the point statement.

JUSTIFICATION OF THE ESTIMATE

The record should show, Mr. Reporter, and place in the record pages 6, 7, 8, the bottom of page 10, and 11 of the Commerce Department Justifications for Civil Defense.

(The pages referred to follow:)

DEPARTMENT OF COMMERCE

Recapitulation of estimates

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(a) General Administration:				
(1) Transportation staff (Emergency transportation coordinating functions)			$175,000	+$175,000
(2) Office of Emergency Planning Coordinator	$178,013	$175,000	183,600	+8,600
(3) Defense Air Transportation Administrator	103,328	103,000	104,000	+1,000
(b) Bureau of the Census	84,000	81,000	227,000	+146,000
(c) Business and Defense Services Administration	1,905,200	1,888,200	1,888,200	
(d) Maritime activities	65,421	68,000	75,900	+7,900
(e) Weather Bureau	345,575	147,000	147,000	
Total program (obligations)	2,681,537	2,462,200	2,800,700	+338,500
Comparative transfers from other accounts and adjustments	−103,650	23,082		−23,082
Total	2,577,887	2,485,282	2,800,700	+315,418

(a) *General Administration*

(1) Transportation staff, $175,000:

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation:				
Permanent positions			$115,400	+$115,400
Positions other than permanent			15,000	+15,000
Total			130,400	+130,400
Personnel benefits			9,100	+9,100
Other objects			35,500	+35,500
Total			175,000	+175,000

The Department is requesting an increase of $175,000 to cover emergency transportation coordinating functions expected soon to be delegated to the Secretary by the President. An Executive order is expected to be issued within the near future to direct the Secretary of Commerce to develop long-range programs designed to integrate the mobilization requirements of all forms of commerce with all national and international transportation systems, including air, ground, water, and underground, in an emergency. The funds requested for this purpose will provide for 14 new positions within the Office of the Under Secretary for Transportation and related costs of administering these new responsibilities.

More specifically, the emergency transportation function will involve the consolidation, evaluation, and interpretation of current and projected resources and requirements data developed by all Federal agencies concerned with all modes of transportation for the purpose of initiating actions designed to stimulate action by Government and industry to improve the peacetime structure of the national transportation system for use in an emergency. This includes the responsibility to determine the proper apportionment and allocation of total transportation capacity to meet overall essential civil and military needs.

The new staff requested will also conduct a continuing analysis of transportation problems and facilities in relation to long-range economic projections for the purpose of recommending programs designed to bring all modes of transportation in balance with each other, with current economic conditions, with projected peacetime conditions, and with emergency conditions.

An equally essential function will be the development of plans and procedures to provide a central system for interpretation of passenger cargo movement demands of shipper and user agencies as they relate to the capabilities of various

transport modes in existence at the time. A system will also be designed to permit the establishment of transportation priorities and allocations by mode or within a mode, as well as Federal enforcement procedures through the use of education, incentives, embargoes, permits, sanctions, and claimancy policies.

Every effort will be made to integrate the emergency transportation functions with those that are being carried out with respect to planning the peacetime transportation system as a whole. Total staff resources within the Under Secretary's Office will be realined to bring about the most effective use of personnel.

(2) Office of the Emergency Planning Coordinator, $183,600:

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation:				
Permanent positions	$152,228	$153,900	$161,900	+$8,000
Personnel benefits	11,155	11,100	11,700	+600
Other objects	14,630	10,000	10,000	
Total	178,013	175,000	183,600	+8,600

The Office of the Emergency Planning Coordinator is responsible for the initiation, development, coordination, and testing of civil defense and defense mobilization plans of the Department as a whole and of its constituent agencies.

The table above reflects the level of support derived principally from allocations from OCDM and its successor, OEP, during 1961 and 1962. Total support for the Office is shown under the estimate for "Salaries and expenses, general administration."

The mobilization planning for the Department of Commerce and the developing of an adequate degree of operational readiness to meet an emergency is not a static program. Those aspects of the program pertaining to civil defense are continually changing and it is expected that under Department of Defense leadership there will be further changes which will be reflected in the Department of Commerce areas of responsibility.

The key elements of this program are a direct responsibility of the Secretary, in compliance with Presidential directives.

The Secretary has delegated the overall responsibility for initiation, development, coordination, and testing of the civil defense and defense mobilization plans of the Department as a whole and of its constitutent agencies, to the Emergency Planning Coordinator, under the direct supervision of the Assistant Secretary for Administration and Public Affairs.

Among the functions of the Emergency Planning Coordinator are: (1) Review and revise as necessary the essential functions of the Department of Commerce and its constituent agencies; (2) review and revise the Department's emergency continuity-of-operations plan to insure its adequacy and consistency with the national plan for civil defense and defense mobilization, and related classified plans; initiate where necessary or review plans developed by thhe constituent agencies for adequacy and consistency with the Department's plan; (3) serve as the Department's representative (or as alternate or observer, where secretarial level representation is required) to all interagency committees whose primary purposes are in the field of civil defense or defense mobilization; (4) provide for departmental representation in the regional headquarters of the regional offices of the Office of Civil Defense, Department of Defense, and of the Office of Emergency Planning, and direct the efforts and activities of the Department's regional Emergency Planning Coordinators designated for this purpose; (5) review, revise as necessary, and conduct a departmentwide program of individual and group training in radiological defense, first aid, and survival; (6) maintain the Department's program for the continuous activation of its emergency readiness staff at the seat of government's classified location, including the selection and indoctrination of members of this staff in cooperation with the agencies concerned; (7) direct the Department's participation in joint tests and exercises including Operations Alert; (8) manage the operation of the Department's physical facilities for emergency relocation and establish the rules and procedures under which the administrative support is furnished to other agencies sharing the Department's relocation facilities; and (9) cooperate with the Office of Emergency Planning in coordinating the planning of the Department and its constituent agencies for the necessary actions in the event of national disaster.

Financial support for 18 of the total office complement of 21 positions has in the past been derived from allocations from other agencies, principally OCDM and its successor, OEP. Of this amount, two positions, an assistant to the Emergency Planning Coordinator for civil defense activities and a clerical assistant, are assigned to the Washington office. Sixteen positions are located throughout the eight regional offices established by OCDM. Each regional office is staffed by a regional coordinator and a secretary.

The personnel included in the regional offices serve as the counterpart of the Emergency Planning Coordinator provided in the Washington office. They represent the Department of Commerce on the regional civil and defense mobilization board and under the immediate direction and supervision of the Emergency Planning Coordinator initiate, develop, and test all plans for the continuity of essential functions by the constituent agencies of the Department having field activities.

In the event of an emergency resulting in the cutoff of the regional area from national headquarters, the regional emergency planning coordinators, acting for the Secretary of Commerce, direct and control the activities of all Commerce agencies within their respective regions.

Increase for 1963.—In the past, in order to make travel funds available to the eight regional coordinators, it has been necessary to impound two secretarial vacancies in the field. The additional funds requested in 1963 will permit filling these vacancies and correct the inequitable situation caused by absence of secretarial assistance to the regional coordinators affected.

(3) Defense Air Transportation Administration, $104,000:

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation:				
Permanent positions	$84,310	$86,100	$86,100	
Positions other than permanent	1,975	2,200	2,200	
Total	86,285	88,300	88,300	
Personnel benefits	5,838	6,600	6,600	
Total personnel compensation and benefits	92,123	94,900	94,900	
Other objects	11,205	8,100	9,100	+$1,000
Total	103,328	103,000	104,000	+1,000

This activity provides for planning the mobilization of civil resources in order to insure that in time of war the air transportation facilities of the Nation will be adequate and effectively used. Financial support for the activity has been derived from allocations from other agencies, principally OCDM and its successor, OEP, during 1961 and 1962.

Increase for 1963.—Additional travel funds are requested in 1963 to enable professional staff personnel to attend various meetings which have a direct effect on the DATA program.

The Defense Air Transportation Administration (DATA) has been assigned the responsibility and delegated the authority for preparation of national emergency plans and to develop preparedness programs covering Federal action with respect to civil air transport. Within the areas designated the Office develops plans for a national program to utilize civil air transportation resources, both domestically and internationally. Planning includes, but is not limited to, analyzing requirements and allocation of civil aircraft to meet such requirements (military, civil, and other purposes); administration of air priority system; war risk insurance; participation in NATO civil aviation planning.

Program needs.—The need for continuation of the programs conducted by DATA becomes more apparent in view of the deteriorating world situation, as such programs relate directly to the mobilization of civilian aviation resources to meet emergency airlift requirements. In view of these conditions, the civil reserve air fleet (CRAF) program is being closely monitored. In the interest of improved readiness of the fleet, DATA has been working closely with Air Force and MATS representatives on new and more exacting allocation principles, which went into effect with the fiscal 1963 allocation.

Upon receipt of the new fiscal year 1962 requirements from the Department of Defense, a complete rework of the present CRAF allocation will be required. An innovation to be accomplished during this new allocation will be the inclusion of the military requirements for domestic civil airlift, along with the international requirements. These domestic requirements have been previously known as the Logair (Air Force) and Quicktrans (Navy) programs.

As an interim program to expedite increased capability to meet immediate cargo requirements, the Defense Air Transportation Administration has under study with various aircraft manufacturers and CRAF participating airlines possible ways to build up a modern long-range turbine-powered air cargo fleet from the existing civil inventory.

The Secretary of Commerce is authorized by law, with the approval of the President, to provide war risk insurance for protection of aircraft and persons and property transported thereon. All necessary findings have been made and necessary Presidential approval has been obtained. Pursuant to this basic authority, an interim binder program is being maintained by DATA under appropriate delegated authority which consists of three phases:

(*a*) Standby arrangements for immediately providing premium-type insurance upon application by the carriers. This readiness position is required in order that the foreign and oversea commerce of the United States may not be disrupted in the event of an emergency.

(*b*) Nonpremium insurance for purposes of the civil reserve air fleet program. The providing of insurance for this purpose has been approved by the President. The Secretary of Commerce has agreed to make insurance available to the Department of Defense under certain indemnity arrangements for payments of losses. This phase of the program is most active at this time. Applications are being received and interim binders are being issued. To date binders have been issued covering 169 CRAF aircraft; other applications are pending adjudication. The provision of aviation war risk insurance is an essential element of the CRAF program and any restriction of program activities could have serious national defense implications.

(*c*) Nonpremium insurance is available to the Department of State in connection with contracts with air carriers for emergency airlift. The providing of this insurance have also been approved by the President, and the Secretary of Commerce is committed to make the insurance available when needed.

In addition, the Secretary may be called upon at any time to provide war risk insurance in connection with airlift activities of other departments or agencies of Government such as the CIA, AID, etc.

The National emergency defense airlift (NEDA) is a plan developed by the Defense Air Transportation Administration for the utilization of the more than 1,200 business and privately owned multiengined aircraft in the 12,500-pound class and over. This plan provides for the use of these aircraft on a voluntary basis for emergency airlift in support of civil defense and other essential needs in the initial stages of a national emergency.

An intensified effort is underway to secure appointments of NEDA aircraft mobilization coordinators and alternates at 1,000 nationwide airports. This is being accomplished with the cooperation of the eight Office of Emergency Planning (OEP) areas, the respective State civil defense directors and the State directors of aeronautics. Six hundred coordinators have been appointed in 24 States and the planning schedule calls for the remainder of the States to be covered before the end of 1962. The number of airports will be expanded to include nonairline airports capable of NEDA operations.

A study is being undertaken with the assistance of OEP to determine the responsibility for Government indemnification against loss of NEDA aircraft, crews, passengers, and third-party liability, as well as Government reimbursement for use of NEDA aircraft. The results will be made known to the large number of NEDA aircraft owners who have requested this information.

Action is being initiated to compile the various State emergency defense airlift (SEDA) plans now in existence and to assist those States which have not as yet developed a SEDA plan. This plan relates to business and privately owned aircraft under the gross weight of 12,500 pounds which will support civil defense requirements at the State levels.

Coordination of the war air service pattern activities with the Civil Aeronautics Board; the implementation of a system for establishing priorities on U.S. nontactical military and civil transport aircraft, and the participation in planning for the preservation of civil aviation to the extent possible during

the initial stages of an emergency and the subsequent most advantageous use of these facilities for NATO countries will require DATA to be actively engaged in the performance of these functions.

No additional positions are requested for fiscal 1963.

(b) Bureau of the Census, $227,000

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation:				
Permanent positions	$12,230	$15,000	$64,000	+$49,000
All other	52,770	48,000	107,000	+59,000
Subtotal	65,000	63,000	171,000	+108,000
Personnel benefits	5,000	5,000	14,000	+9,000
Other objects	14,000	13,000	42,000	+29,000
Total costs	84,000	81,000	227,000	+146,000

Summary of increase for 1963.—This is a new activity to be established in the appropriation, "Salaries and expenses, Bureau of the Census," in fiscal 1963, resulting from the decision to transfer financing of functions previously funded by allocation from the civil defense and mobilization program. The amount of $227,000 requested for fiscal 1963 is an increase of $146,000 over the level of financing in fiscal 1962, and is needed for the following purposes:

(1) Support for census staff assigned full time to the National Resources Evaluation Center	$25,000
(2) Updating census records relating to critical manufacturing plants	14,000
(3) Planning for a postattack population survey	34,000
(4) Computation of the surface area of each of the standard geographic locations included in the national location code	127,000
(5) Proportionate share of Bureau administrative expense for this activity	27,000
Total	227,000

Base program.—The primary emergency planning responsibility of the Bureau of the Census is to provide the data on human and economic resources required by the National Resources Evaluation Center and the Office of Emergency Planning area offices, as outlined in Emergency Planning Order No. 2, issued January 10, 1961, and now by Executive order. For the past several years, Census, with funds provided by allocation from the Office of Civil Defense Mobilization, has been furnishing a limited amount of basic statistical data and services. The work programs conducted in fiscal years 1961 and 1962 have provided for: (*a*) assignment of a professional staff member to the National Resources Evaluation Center, (*b*) preparation of mapping and boundary data for a national location code, and (c) updating of census records relating to critical manufacturing plants.

Justification of increase for 1963.—The level of funds provided heretofore for statistical support is not adequate to meet the needs of the National Resources Evaluation Center, and the Bureau of the Census has been requested to increase the program in fiscal year 1963 as follows:

(1) Furnish one additional full-time professional statistician to the evaluation center;

(2) Define the problems involved in a postattack survey of the population, and develop specific survey plans; and

(3) Compute surface areas of the standard geographic locations established in the new national location code for use in obtaining population and housing density measures.

A total of $227,000 will be needed in fiscal 1963 to permit this work to be done.

(c) Business and Defense Services Administration, $1,888,200

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation:				
Permanent positions	$1,423,000	$1,493,000	$1,493,000	
All other	21,700	18,000	18,000	
Subtotal	1,444,700	1,511,000	1,511,000	
Personnel benefits	103,300	113,000	113,000	
Other objects	357,200	264,200	264,200	
Total obligations	1,905,200	1,888,200	1,888,200	

Base programs.—The Business and Defense Service Administration is responsible for the production resources of the Nation in the event of national emergency. It administers currently a system of priorities which assures completion of current military and atomic energy and space programs of production and construction. Authority for BDSA to allocate materials in the civilian economy is currently included in the Defense Production Act, when certain conditions exist. The agency is the nucleus of an emergency production agency, serving as the delegate agency of the Office of Emergency Planning, formerly the Office of Civil and Defense Mobilization, with full and complete authority and responsibility for achieving maximum utilization of production resources of the Nation. BDSA is a reservoir of technical, operational and economic information on the functioning, structure and characteristics of the Nation's business and industry.

The following general descriptions of the mobilization functions of the agency attempt to show in broad outlines the scope of daily preparedness activities. Each program is designed to cover those functions which the agency would be called upon to perform in coping with any type of emergency.

(1) Keeping defense production and construction on schedule: The priorities powers of the President under the Defense Production Act are administered by BDSA and are utilized to compel the acceptance and performance of Department of Defense, atomic energy, and space programs orders for production and construction. The current defense materials system and related orders and regulations assure the continuing timeliness of our most vital defense programs and provide a mechanism for ready expansion to cover production and materials for civilian use in the event of a full emergency.

(2) Production and material resources: Activities in this vital area relate to important economic and technical recommendations on national stockpile matters and policy, survival items availabilities, identification of industrial facilities of prime national importance, economic effects of imports under title 8 of the Trade Agreements Extension Act, disposition of surplus stockpile items, and national economic effects of the barter program under the Agricultural Trade Development and Assistance Act (Public Law 480), and many other programs affecting national resources and production.

(3) War production organization program, including the Executive Reserve: BDSA as the production agency for an emergency has designated over 1,300 leaders of American industry and business to staff the agency when needed. Training of these reservists is a continuing program. While training, the reservists participate directly in the mobilization activities such as the industrial preparedness programs. The majority of these reservists have completed the required administrative actions which will permit them to become, automatically and immediately, full-time Government employees in the event of an attack on the United States. Programs involving extensive education of vital American industry on what is expected of it during emergency periods continue under BDSA's direction.

(4) Facts for emergency devision: No system of industrial controls or operations is possible unless the necessary data are available. Thus BDSA as the production agency conducts full-scale supply-requirements studies, establishing levels of essential civilian and defense supporting products and materials for a wartime economy. Specific studies of critical items of production and supply are conducted at the request of DOD and AEC and basic industrial economic studies important to national security from the basis for such action programs in economic warfare as determined by the executive branch.

The financing of industrial mobilization functions for the current year is by allocation from the Office of Emergency Planning, formerly OCDM, in the amount of $1,888,200 which provides for an average employment of 165 man-years at a cost of $1,511,000 and other object costs of $377,200. These amounts have been included in the 1962 adjusted base. No increase is requested for fiscal year 1963.

(d) Maritime Administration, $75,900

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation (permanent positions	$56,814	$58,100	$60,000	+$1,900
Personnel benefits	4,030	4,300	4,500	+200
Other objects	4,577	5,600	11,400	+5,800
Total obligations	[1] 65,421	[1] 68,000	[1] 75,900	+7,900

[1] Fiscal years 1961 and 1962 requirements are funded by allocation from the OEP (formerly OCDM) and the OCD of the DOD; fiscal year 1963 requirements are included in the request for "Salaries and Expenses, Maritime Activities."

Responsibilities.—The Maritime Administration, as a delegate agency of the Office of Emergency Plannning and Office of Civil Defense of the Department of Defense, is responsible for the national port defense mobilization program as it relates to port systems and facilities in the United States and its territories and possessions. This includes the development of plans for a national program, compatible with approved plans and programs of international treaty organizations of which the United States is a member, which would insure the availability, in emergencies, of ocean ports and port facilities adequate to the needs of the Nation and its allies. The total program is divided into two principal work areas:

(1) Port defense mobilization planning: This function covers the development of plans which provide for: control of traffic through port areas to assure an orderly and continuous flow; administration of priorities for the movement of such traffic; allocation of available ports and port facilities; performance of required supporting activities, such as maintenance of port facilities; and preparation to act as claimant for the ocean port industry for materials and manpower required thereby.

The implementation of this activity involves the development of policies, plans and programs for Federal control of port utilization under emergency conditions and the continued operation of some 110 U.S. seaports under such conditions. It includes the determination of and planning for port requirements, expansion, supply, manpower, alternate ports and port facilities, restoration and stockpiling. It requires the establishment and administration of a port unit of the National Defense Executive Reserve which would form the nucleus of an emergency-period Federal port control organization.

(2) Port damage assessment: This function covers such activities as provision to the National Resources Center of data for assessment of potential or actual enemy bomb damage to U.S. ports (including full-time Marad representation at the NREC); maintenance of a current national inventory of port facilities; maintenance on behalf of the several Federal agencies, of estimates of trans-shipment capacities of U.S. ports; participation in damage assessment exercises.

Accomplishments, future plans.—During fiscal year 1961 there were prepared and inaugurated two major national programs involving some 110 port communities in the United States, its territories and possessions, and including preparation of policy papers, guide manuals, instructional material, etc., i.e. (1) a program of local industry planning for the continued operation of ports under emergency conditions; (2) a Federal level plan for the utilization and control of U.S. ports. Action was begun to supplement and update port damage assessment information covering all U.S. port facilities. Action was started to recruit 200 members of the port unit of the National Defense Executive Reserve. Studies were undertaken on use of alternate ports, restoration, etc.

Going into fiscal year 1962 there were prepared and distributed nationally the required six annexes to the basic Federal port control manual. A review was begun of "continued operation" plans being submitted by local ports. In addition to continuation of activities underway, the following items are pro-

jected for the balance of the current year: completion of initial supplementation and updating of port damage assessment data; completion of a national inventory covering all U.S. port facilities; preparation of an estimate of U.S. port trans-shipment capacity; continuation of development of a Manual on Port Improvisation and Rehabilitation.

The fiscal 1963 work program anticipates the following significant items: completion of recruitment of Executive Reservists; continuation of provision of current instructional material to the reservists; completion of the port improvisation manual; determination of restoration and stockpiling requirements; policy and program; general supplementing and updating, as necessary, of all emergency programs.

(e) Weather Bureau, $147,000

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Personnel compensation	$253,134	$104,800	$104,800	----------
Personnel benefits	18,580	7,900	7,900	----------
Other objects	73,861	34,300	34,300	----------
Total	345,575	147,000	147,000	----------

For several years the Weather Bureau has operated a program of meteorological readiness under a delegation of functions financed by allocations from OCDM. This program includes the forecast of fallout from atomic debris. "Fallout" is the deposition on the ground of radioactive particles produced by a thermonuclear explosion. The areas of fallout are largely dependent upon the upper-air winds and precipitation prevailing at, and shortly after, the explosion. Fallout forecasts are predictions of the extensive area in the general vicinity of the assumed targets likely to receive radioactive fallout. Advance knowledge of the areas where fallout will occur would be vital to survival in the event of enemy attack. Fallout area forecasts are issued on a continuing basis from 72 Weather Bureau upper-air observing stations. These forecasts would be essential to warning, evacuation, dispersal and sheltering in an emergency situation.

We propose in fiscal year 1963 that the cost of this program, previously funded by funds from OCDM under a delegation of functions, be supported directly from the Weather Bureau's "Salaries and expenses" appropriation.

DEFENSE AIR TRANSPORTATION

Mr. EVINS. Mr. Ruder, you referred in your statement to the Defense Air Transportation Administrator's budget, $104,000, a $1,000 increase. Don't the CAA and FAA have quite a staff and large appropriations for these purposes? What are you doing for civil defense in this Bureau?

My thought was the CAB and FAA both have a large staff and budget and that they could very well absorb it.

Mr. RUDER. May I ask our Deputy Under Secretary to answer that?

Mr. EVINS. What are you doing for civil defense?

Mr. BARTON. We allocate in the case of civil emergency the civil aircraft to make sure they are allocated properly to the military and to the civilian needs. This, of course, involves seeing to the transport of goods and persons.

We found in looking at this that the capability for the transport of cargo is a little on the short side. We are trying, through converting aircraft and other plans, to make up for this inadequacy.

Mr. EVINS. We have the Air Force, Defense Department, CAB, the FAA and just what does your Air Transport Service do in civil defense?

Mr. BARTON. Someone has to referee the claims of these various agencies to see that the proper allocation is made between civilian and military requirements.

Mr. EVINS. You are the referee?

Mr. BARTON. That is right, yes, sir.

SUMMARY OF REQUEST

Mr. EVINS. You have in your 1963 estimate $175,000 for transportation staff; $183,600 for the Office of the Emergency Coordinator; $104,000 for Defense Air Transportation Administrator; and the Bureau of the Census shows a $146,000 increase.

For Maritime activities, there is an increase of $7,900 and no increase is reflected but identical amounts for Weather Bureau and the Business Defense Services Administration.

SUMMARY OF EMPLOYMENT AND OBLIGATIONS

Mr. JONAS. Your 14 new positions figure out $12,500 apiece, is that right, in the Office of the Secretary——

Mr. THOMAS. Get the total employment table for the last 6 years in the Department of Commerce by division.

Mr. JONAS. Do you have that information with you?

Mr. NIELSON. If you want to go back 6 years, there are two or three items in here that of course we do not have.

Mr. THOMAS. What is your overall figure as of now for your employment?

Mr. NIELSON. The average employment rate now in 1962 is about 216.

Mr. THOMAS. Give us a record here since 1955 of the amount of funds.

Mr. EVINS. There is no table showing the personnel.

Mr. THOMAS. The amount of funds and the personnel by years, either appropriated funds to the Department for Civil Defense purposes. You have had an appropriation for about 7 years on the specific basis for this activity.

Mr. NIELSON. For a number of items, that is correct.

Mr. THOMAS. Break it down as best you can between the activities, but give us an overall figure. The employment to date of all activities in the various offices.

What is the total as of today?

Mr. NIELSON. 216 is the average employment. I will provide for the record exactly what you have asked for, going back on this 7-year basis.

(The information supplied follows:)

Summary of civil defense and defense mobilization activities, fiscal years 1955–62

1955

	Man-years, personnel	Allocation	Appropriated funds	Total costs
General administration:				
Office of Emergency Planning: Coordinator				
Defense air transportation: Administrator	7		$70,236	$70,236
Total	7		70,236	70,236
Business and Defense Services Administration	140	$1,700,000		1,700,000
Bureau of the Census				
Maritime Administration				
Bureau of Public Roads	2		21,938	21,938
Weather Bureau	1	10,000		10,000
Total, Department of Commerce	150	1,710,000	92,174	1,802,174

1956

General administration:				
Office of Emergency Planning: Coordinator	1		$9,500	$9,500
Defense air transportation: Administrator	7		74,153	74,153
Total	8		83,653	83,653
Business and Defense Services Administration	140	$1,700,000		1,700,000
Bureau of the Census				
Maritime Administration				
Bureau of Public Roads	12	60,112	30,322	90,434
Weather Bureau	7	79,516		79,516
Total, Department of Commerce	167	1,839,628	113,975	1,953,603

1957

General administration:				
Office of Emergency Planning: Coordinator	1		$8,900	$8,900
Defense Air Transportation: Administrator	7		73,116	73,116
Total	8		82,016	82,016
Business and Defense Services Administration	140	$1,700,000		1,700,000
Bureau of the Census	1		10,000	10,000
Maritime Administration				
Bureau of Public Roads	10	47,538	37,509	85,047
Weather Bureau	29	230,000		230,000
Total, Department of Commerce	188	1,977,538	129,525	2,107,063

1958

General administration:				
Office of Emergency Plannint: Coordinator	2		$23,000	$23,000
Defense Air Transportation: Administrator	7		78,333	78,333
Total	9		101,333	101,333
Business and Defense Services Administration	140	$1,700,000		1,700,000
Bureau of the Census	1		8,400	8,400
Maritime Administration				
Bureau of Public Roads	4	3,529	47,039	50,568
Weather Bureau	27	253,087		253,087
Total, Department of Commerce	181	1,956,616	156,772	2,113,388

Summary of civil defense and defense mobilization activities, fiscal years 1955–62—Continued

1959

	Man-years, personnel	Allocation	Appropriated funds	Total costs
General administration:				
Office of Emergency Planning: Coordinator	3		$35,000	$35,000
Defense Air Transportation: Administrator	8		85,026	85,026
Total	11		120,026	120,026
Business and Defense Services Administration	140	$1,700,000		1,700,000
Bureau of the Census	1		11,000	11,000
Maritime Administration				
Bureau of Public Roads	4		50,978	50,978
Weather Bureau	28	238,500		238,500
Total, Department of Commerce	184	1,938,500	182,004	2,120,504

1960

General administration:				
Office of Emergency Planning: Coordinator	10	$86,000	$31,332	$117,332
Defense Air Transportation: Administrator	8	95,000		95,000
Total	18	181,000	31,332	212,332
Business and Defense Services Administration	154	1,757,192		1,757,192
Bureau of the Census	9	20,159		20,159
Maritime Administration	3	69,500		69,500
Bureau of Public Roads	6	8,799	64,552	73,351
Weather Bureau	27	275,000		275,000
Total, Department of Commerce	217	2,311,650	95,884	2,407,534

1961

General administration:				
Office of Emergency Planning: Coordinator	19	$178,013	$39,735	$217,748
Defense Air Transportation: Administrator	8	103,328		103,328
Total	27	281,341	39,735	321,076
Business and Defense Services Administration	156	1,802,000		1,802,000
Bureau of the Census	5	83,502		83,502
Maritime Administration	7	65,400		65,400
Bureau of Public Roads	7	32	94,591	94,623
Weather Bureau	30	345,575		345,575
Total, Department of Commerce	232	2,577,850	134,326	2,712,176

1962

General administration:				
Office of Emergency Planning: Coordinator	19	$175,000	$39,785	$214,785
Defense Air Transportation: Administrator	8	103,000		103,000
Total	27	278,000	39,785	317,785
Business and Defense Services Administration	165	1,839,000		1,839,000
Bureau of the Census	5	81,000		81,000
Maritime Administration	7	61,750	6,250	68,000
Bureau of Public Roads	7		97,000	97,000
Weather Bureau	25	280,000		280,000
Total, Department of Commerce	236	2,539,750	143,035	2,682,785

INCREASE IN POSITIONS REQUESTED

Mr. JONAS. You are asking for $315,418 more than you had in 1962. You have indicated that $175,000 of that is for 14 new positions in the Secretary's office. How many other new positions are there throughout the six activities that are involved in this increase?

Mr. NIELSON. I think in the transportation area we do have an increase of 4 positions.

In the Office of Emergency Planning Coordinator we have indicated we do want additional funds to take care of two vacancies which we are curerntly carrying. The number of people is 16, but we do have authority for 18. In the Defense Air Transportation Office there is no increase in employment. The amount is approximately eight, the number of people.

Mr. EVINS. Increases?

Mr. NIELSON. That is right.

In the Bureau of the Census we do have an increase from about 5 to 24. BDSA, there is no increase in the number of people.

In the Maritime Administration I am happy to say there is no increase in the number of people. There is 0.3 of a man-year that is shown.

In the Weather Bureau we have a decrease from about 30 to 15 positions.

Mr. JONAS. How do you do that? You are asking for the same amount of money.

Mr. NIELSON. Mr. Jonas, for purposes of this particular table here to make these comparable it does show the amounts are the same. However, we did have substantially more money for this activity and there is one function that has been deleted for Weather Bureau, so there will be no question.

Mr. EVINS. How much are you carrying over in funds?

Mr. NIELSON. In funds for 1962?

Mr. EVINS. Unexpended.

Mr. NIELSON. I could not say at the present time, since we will not have our reports until June. I would not be able to give you the figure although we may be able to give you an estimate as to what the unexpended balances will be as of June 30.

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

Mr. THOMAS. Mr. Evins, may I interrupt you there. I would like to get into the matter of the Business and Defense Services Administration. Mr. Foley has a statement and I have some questions.

(The statement referred to follows:)

STATEMENT ON INDUSTRIAL MOBILIZATION BY EUGENE P. FOLEY, ADMINISTRATOR OF THE BUSINESS AND DEFENSE SERVICES ADMINISTRATION BEFORE THE INDEPENDENT OFFICES APPROPRIATION SUBCOMMITTEE

The financing of the industrial mobilization functions of the Business and Defense Services Administration for the current year is by allocation from the Office of Emergency Planning, formerly OCDM, in the amount of $1,888,200 which provides for an average employment of 165 man-years at a cost of $1,511,000 and other object costs of $377,200. No increase is requested for fiscal year 1963 for this purpose.

The Business and Defense Services Administration is responsible for the administration of the priorities and allocation authority contained in title I of the Defense Production Act under delegation from the President. It administers the defense materials system, a set of regulations, orders and procedures which are designed to assure the timely completion of production, construction and research and development programs of the Department of Defense, the Atomic Energy Commission, and the space agency, by compelling the acceptance and preferential performance of procurement orders for these programs.

By direction of the President, BDSA has established a superpriority for all important missiles and space programs. Because of the recently undertaken atomic weapons testing and the accelerated procurement of our defense agencies, we have just instituted new procedures to expedite deliveries of materials and equipment for these purposes. The current defense budget of over $50 billion provides over $20 billion for military hard goods including research and development. In addition to accelerating general economic activity a program of this magnitude causes pressures on suppliers of a great number of products and materials. BDSA through its special priorities procedures has been successful in breaking production bottlenecks and avoiding delivery delays. This is accomplished by revising production and delivery schedules of defense contractors and suppliers. We anticipate that the present annual rate of 950 cases will expand to over 1,500 cases in fiscal year 1963.

The defense materials system and the related special priorities procedures, which have been in existence since 1950, constitute not only a method of assuring timely completion of current national security programs but also a mechanism which can be expanded readily in an emergency to cover the allocation of materials in the private sector of the economy upon an appropriate finding by the President.

BDSA has developed an emergency system of priorities designed to insure the production of vitally needed items for survival and the performance of essential services after a possible attack on this country.

BDSA submits quarterly reports to the Joint Committee on Defense Production describing not only the administration of title I of the Defense Production Act but also the activities under all of the preparedness programs of the agency.

BDSA is responsible for providing advice and counsel to OEP, GSA and other interested Government departments and agencies on stockpile specifications, storage procedures, disposal plans, estimates of mobilization requirements, domestic materials availability, stockpile items, technology, and related matters.

The Secretary of Commerce under Executive Order 10421 is responsible for the identification of those products, services, and supporting facilities which are of exceptional importance to industrial mobilization and national survival. The Industry Evaluation Board was established for this purpose with an official of BDSA as Chairman, supported by a BDSA staff. The facilities identified by this Board provide us with detailed information concerning those industries and facilities which produce vital products for our national defense needs and for economic recovery and survival. This information includes basic data on production capacity, plant relocation, facilities production and essential services which are vital to our national defense preparedness.

We recognize that no effective system of expanded industrial activity to meet emergency needs, whether a limited war or a nuclear attack, can be successful without a corps of trained individuals to fulfill the emergency responsibilities assigned to us. For this purpose we have recruited from industry, on a widely dispersed geographical and industrial basis, over 1,300 members of the National Defense Executive Reserve. This program was authorized by the Congress in a 1956 amendment to the Defense Production Act. The BDSA members of the National Defense Executive Reserve are provided with intensive training, both in Washington and in the field, by members of the agency staff to prepare them to carry out our emergency functions.

To meet our emergency responsibilities we must be assured that the Executive Reservists and other Government personnel charged with emergency responsibilities will have sufficient facts available to them to make sound judgments under critical conditions. Accordingly, we have prepared and stored in nine strategic locations throughout the country the data we believe would be necessary for such decisionmaking.

There are, of course, other programs of a vital nature for which BDSA is responsible. These include the assessment of the economic effects of certain imports under section 8 of the Trade Agreements Act which relates to the

potential impairment of national security, the conduct of full scale supply requirements studies establishing levels of essential civilian and defense-supporting products and materials; and the performance of studies necessary to assure the maintenance of the American industrial machine to support national strategic plans.

The President has just recently signed Executive Order 10999 assigning emergency planning responsibilities to the Secretary of Commerce who in turn has delegated the industrial mobilization programs of BDSA. The assignment of these emergency preparedness activities reflects the expressed policy that maximum use should be made of existing departments in carrying out the assigned programs. We in BDSA, operating under authority of an existing law, the Defense Production Act, are able to coordinate all these activities in the interest of efficiency and economy.

BSDA APPROPRIATION HISTORY

Mr. THOMAS. Two-thirds of your fiscal year 1963 budget is for BDSA. What is the BDSA's regular budget for 1962 and 1963, not in this regard but its regular budget in the Department of Commerce bill? What is it in fiscal year 1962 and what is it in fiscal year 1963?

Mr. MERKIN. In 1962 the regular budget is $6 million.

Mr. THOMAS. What is it for fiscal year 1963?

Mr. MERKIN. It is $6.9 million, sir. That includes this amount. Both figures include——

Mr. THOMAS. I want separate figures excluding this.

Mr. MERKIN. In 1962 the adjusted base is $4,111,800.

Mr. THOMAS. What is it this year excluding this item?

Mr. MERKIN. That is the figure excluding this item.

Mr. THOMAS. It is $4.1 million?

Mr. MERKIN. $4.1 million.

Mr. THOMAS. What is 1963?

Mr. MERKIN. $5,011,800.

Mr. THOMAS. How many employees did the $4.1 million in 1962 and the $5 million in 1963 take care of in your regular appropriation?

Mr. MERKIN. Our regular appropriation in fiscal year 1962 would take care of 593 employees with an average employment of 421, excluding 165 man-years on the mobilization program.

In 1963, 676 employees with an average employment of 500, excluding 165 man-years on the mobilization program.

Mr. THOMAS. What part of your regular appropriation goes for outside activities such as transportation and per diem for the distinguished gentlemen from industry that you are bringing in for studies and so forth?

Mr. MERKIN. Of the total amount requested for mobilization activities in both fiscal years, we estimate $32,000 for travel and per diem.

ABSORPTION OF CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. Why cannot BDSA's regular budget absorb all this activity? What is the BDSA doing that it cannot absorb this?

Mr. NIELSON. We have the Administrator of BDSA here with us. He has a statement and as you know the Chairman has been very helpful in terms of this particular item on BDSA because we have had problems in the past in terms of funding at locations and I think it would be very desirable if the Chairman would be agreeable——

Mr. THOMAS. Let us have the Administrator.

Why can you not absorb all of this in your regular budget?

Mr. FOLEY. Mr. Chairman, BDSA actually has two major responsibilities. One, of course, is a mobilization responsibility which we are talking about this morning and the second one has to do with the civilian aspects of the industrial economy.

Mr. THOMAS. You have had those all the time?

Mr. FOLEY. That is right.

Mr. THOMAS. That has been the very existence of BDSA?

Mr. FOLEY. That is correct.

Mr. THOMAS. You have been planning ever since you came out of the old Emergency Planning Board in 1946. You have been in operation and you have switched over from the White House organization. You have had a little rationing, a little planning, a little allocation of material. So, what are those 500 people doing now? Is it 500 that you have?

Mr. MERKIN. We have a total staff of 593.

Mr. THOMAS. Why can't they absorb all this? You are not rationing now, you are allocating very little material. What are the brothers doing? You have to keep them busy over there, Mr. Administrator. They will walk off and leave you if you don't.

Mr. FOLEY. In the field of mobilization, sir, we have a considerable number of special assistance cases that are required to keep the defense production line on schedule. Ofttimes we have to send some of our BDSA division men——

Mr. THOMAS. Well, you haven't had any trouble like that since 1948 or 1949. Everything has been running out of our ears. You haven't allocated anything, you haven't had any rationing, you haven't had any wage or price control. So why can't you absorb all this? It is very vital work. We know it is. You have to do some planning.

SPECIAL ASSISTANCE ON DEFENSE CONTRACTS

Mr. FOLEY. There are conflicts in the Defense Procurement programs. It may be the Army will ask for a certain type of steel. The Navy would ask for the same type. On the order board of the company there is a conflict——

Mr. THOMAS. The steel companies claim they have about a 35-million-ton capacity not in operation, out of a total capacity of 147 million tons. If you get those orders over there to them I imagine they are going to turn them out pretty quick.

Mr. JONAS. If you will yield, I thought the Defense Department was supposed to referee the claims between the Army and the Navy. Why do you have to get into that?

Mr. FOLEY. It has been the philosophy of this Government, Mr. Jonas, that the economy be directed by civilians in the Department of Commerce rather than in the Defense Department.

Mr. JONAS. Well, the Defense Department is run by civilians, isn't it?

Mr. FOLEY. Actually, the Department of Commerce administers the priorities program. The Department of Defense will give a

priority and this is where the conflict arises. One branch of the Department of Defense will ask that a certain type of steel be delivered April 1, 1962 to Los Angeles. Another branch of the service might ask that the same type of steel in certain dimensions be delivered to Norfolk by April 1, 1962.

On the order board of the steel company they simply cannot deliver this in that time period.

Mr. THOMAS. They submit to you their needs and after all you have to have this top overall allocation board over there to allocate it. You have to have some such top authority and we realize that.

What is troubling us, though, why all these employees? What are they doing now when they have no allocations and no priorities? This might be a case where there could be a few priorities on half a dozen scarce materials. You have 500 employees.

Mr. FOLEY. Mr. Chairman, we have right now at least 1,000 cases that involve an order signed by either myself as Administrator or Mr. Anthony Bertsch as Deputy Administrator, directing a company to deliver the particular type of material to a specified place, by a specified time. These are 1,000 orders that we resolve as to conflicts, in the Defense Department. In addition to this we work on approximately 4,000 to 5,000 additional cases that never reach the directive order stage——

Mr. THOMAS. With all humility and respect for everything everybody is doing, isn't that largely featherbedding? When you have this tremendous industrial capacity that is not being used—and the steel people will tell you about that every day as you well know. Here it is not being used. Why go through all this window dressing? And then if you have that unused productive capacity, if they just get the orders over to them, I imagine they will get busy and produce most everything the country needs in the way of metal. You may have some handful of scarce items dollarwise that do not amount to 10 percent of your whole economy as far as metals are concerned.

Mr. FOLEY. Mr. Chairman, I think one of the most surprising things I learned after spending several days going through steel mills is that most steel is put out for custom use. It is custom made, by order. The steel mills have to have some type of procedure and regulation and order in their programing and their production. They accordingly have an order board——

Mr. THOMAS. Well, all I am trying to say is if you give the industry a fair opportunity to produce such a need, the opportunity with a reasonable leadtime, they will do it. How far am I wrong?

DEFENSE MATERIELS SYSTEM

Mr. FOLEY. That is quite correct. That is why we have the Defense Materiels System under which we allocate. We try to give the steel industry, the copper industry, the aluminum industry, the industry concerned with nickel alloys, at least 3 months leadtime.

Mr. THOMAS. Copper is running out of our ears, aluminum is running out of our ears. We notice in the stockpile the aluminum people insist on putting—you understand what I am talking about. Copper is the same way.

We could be wrong and you could be right. We are merely raising the question.

You go ahead.

Mr. RUDER. Mr. Chairman, if I may, I apologize for not being a complete expert in this field——

Mr. THOMAS. You do not have to apologize, you have some non-experts on this side of the table, too.

Mr. RUDER. As I looked in the BDSA, and I think all of us came in with the idea of being very critical of the operation at the outset, the understanding that I have developed, first of all, it is a case where non-Defense functions involve certain things of this type: For instance, there is an agency in Government that at the moment is working on the marketing and distribution plant of the country. As you know, distribution costs in this country are mounting incredibly and represent an enormous proportion of the final cost of any product. There are, for instance, within BDSA about 32 people. This is in the non-Defense operation, just working at trying to analyze those parts of the distribution system that might be subject to cost reduction techniques. As we get into a more competitive international problem, this is going to become increasingly important.

Mr. THOMAS. Interstate Commerce has been doing that for 80 years. They have a Bureau of Economics over there, Transport Economics.

Mr. RUDER. Distribution involves far more than transport, however. Distribution involves the structuring of the systems, the use of people within the——

Mr. THOMAS. Well, if you cannot transport it, you are not going to distribute it, are you?

Mr. RUDER. That is true. Transportation is at least half of the distribution problem.

You get into problems of studying potential affects of automation within industry after industry. You get into problems of working closely with Treasury on all kinds of depreciation studies that are required in order for Treasury to go into the revision of their schedule F, which is an enormous program in Treasury and if it is not done with a sophisticated understanding of particular industry requirements——

Mr. THOMAS. Any further questions, gentlemen?

OPERATION OF SPECIAL ASSISTANCE PROGRAM

Mr. EVINS. Mr. Foley, the example you gave of performance for an order on the west coast on a certain day and performance on the east coast for a given day, and you said you had a thousand cases where you resolved differences as a referee, what did you do, tell them to send an order to both places or split it?

Mr. FOLEY. No, sir. We have to meet with the people making the request for this particular type of material.

Mr. EVINS. The Defense Department?

Mr. FOLEY. This may involve traveling to Pittsburgh if it is a steel problem or Akron if it is a rubber problem or Boston if it is an electronics problem, and down the line, trying to see what their problem is. Then we have to make an independent judgment as to which

is more important and which can be best fulfilled in the time requested. This is our judgment and this has been the philosophy of the Government——

Mr. EVINS. Since there is a slack in production and they have a capacity, why don't you put out two orders to deliver 1,000 tons on the west coast and another thousand tons on the east coast and they would probably buy them both?

Mr. FOLEY. I will give you an example of steel. There are four types of material that are treated differently than the rest of the industrial equipment of the country. These are copper, nickel alloys, steel and aluminum. On these we do somewhat what you suggest, namely, we obtain a quarterly estimate of the Defense needs for the next quarter so that industry can plan and produce such items. Even in this case, however, special assistance cases do from time to time arise. A special assistance case that is more typical is in the field of electronics where there may be conflicting demands for computers, for business equipment machines generally.

Mr. EVINS. You generally supply all of the Defense Department demands and requests, do you not? You say you have refereed them and compromised them. You generally supply orders to the manufacturers of all they request, don't you?

Mr. FOLEY. We try to see that the Defense requests are delivered on time. But, our industrial economy is not so regulated and administered that the Federal Government has a scheme or a plan for all the industrial complexes of the country. Actually, we only have this for four areas and that is copper, aluminum, nickel alloys and steel.

We have not so organized our economy as to regulate the rest of it.

Mr. EVINS. Thank you.

FINANCING OF EMPLOYEES PARTIALLY ENGAGED IN CIVIL DEFENSE FUNCTIONS

Mr. OSTERTAG. As I understand it in this budget dealing with the Office of Emergency Planning, or rather the Civil Defense aspect, you have 216 employees planned for this next fiscal year.

Mr. NIELSON. About 250 average, based on the estimate which we have presented. The figure I gave you was 216, for 1962.

Mr. OSTERTAG. What is your estimate for 1963?

Mr. NIELSON. 250 average.

Mr. OSTERTAG. Now, the point I want to raise is simply this: Bearing in mind, of course, that in connection with this particular problem, your studies, you are working, of course, with a broad brush on the economic side of the picture, even though it be transportation and other aspects.

Now, do any of these employees engage in any other work of the Commerce Department or is it wholly associated with the purposes and the clear-cut application of civil defense?

In other words, do they have a dual responsibility in which they are carrying on general activities in the Commerce Department as well as this?

Mr. NIELSON. The only area that would be related here is the BDSA area where you have a specialist, a man who is a specialist in a par-

ticular field that would be doing the normal job of the Department of Commerce and at the same time would be doing some of the defense activities. How do you split it? This is one of our problems. We cannot do this. And in terms of financing, here, we have to split the financing.

Mr. OSTERTAG. You have split the financing in this case?

Mr. NIELSON. That is the only particular case in which that would be true, yes.

Mr. OSTERTAG. Then, all other employees generally speaking are directly associated with this program, and nothing else?

Mr. NIELSON. Those that we have shown in this estimate to be presented to the committee.

Mr. OSTERTAG. How do you keep them apart? I mean in other words it is always in your Department, it is a sort of an intermixed operation, is it not?

Mr. NIELSON. This Office of Emergency Planning coordinator which is indicated here to have about 18 people, this is his sole responsibility, this particular field and he does not get over into other areas and other functions of the Department.

The same is also true here with respect to the small number of maritime activities.

Mr. OSTERTAG. That is all I have.

SPECIAL ASSISTANCE WORKLOAD

Mr. JONAS. I have a question for Mr. Foley. First, you did not answer the chairman's question as to why you could not do this work with your regular force and I would like for you to answer that, but I would like to have you also put in the record how many current conflicts you are working on today, unresolved conflicts, and how many you have disposed of between January 1, 1962, and March 15, And the ones you have disposed of in this calendar year, I would like to know what they involve and whether there is really a shortage that required any resolution of a conflict.

Mr. FOLEY. We can very easily supply this for you in a matter of several days, I believe.

Mr. JONAS. You do not have the information now? Can you tell me how many current cases you are working on right now?

Mr. FOLEY. I believe there are approximately 35 or 40 such cases in the office currently that we are working on. But I could give you the precise information on exactly what you ask: The number of cases between January 1, 1962, and March 15, 1962, and what they involve. This will take a little compilation but we can have it in the next several days. We will be happy to do that.

Mr. JONAS. That is all.

(The information supplied follows:)

BUSINESS AND DEFENSE SERVICES ADMINISTRATION REPORT ON SPECIAL ASSISTANCE CASES

In many cases the regular procedures provided by the Defense Materials System may require extraordinary actions to assure the maintenance of particular national security programs on schedule. This may result from a variety of situations such as competing defense orders for a specialized type of product or material, conflicting priority orders on the supplier's schedule, inadequate facilities to produce the required product or material and the like. In order

to aid defense contractors in overcoming such production bottlenecks or to expedite deliveries, BDSA provides special assistance when needed. Such assistance includes improvements of deliveries by the issuance of special priorities or directives, including production and delivery scheduling.

Several means are employed by BDSA to provide the special assistance described above:

(1) Arrangement of improved delivery dates by informal agreement with the supplier.

(2) Issuance of a DX priority rating if appropriate.

(3) Issuance of a directive requiring the supplier to produce or deliver the specified item by a specified date. Sometimes directives are used to schedule deliveries of the supplier where a number of priority orders are involved.

Number of cases in which regular Defense Materials System procedures have been augmented by special assistance

Special assistance cases pending c.o.b. Mar. 15, 1962	21
Special assistance actions completed Jan. 1, 1962, to Mar. 15, 1962	163
Authorizations issued Jan. 1, 1962, to Mar. 15, 1962	82

BDSA also serves as an allotting agency under the Defense Materials System and in this capacity authorizes privately financed defense construction projects sponsored by the Department of Defense and projects connected with defense programs of Canada and other friendly foreign governments. Allotments of controlled materials and authorizations for the use of ratings are issued by BDSA to permit the preferential procurement of needed products and materials by the contractors or governments involved, from U.S. sources.

Mr. THOMAS. Thank you very much, gentlemen. We have been delighted to have you. You have a great trial over there and you do a fine job.

THURSDAY, MARCH 15, 1962.

FEDERAL AVIATION AGENCY

WITNESSES

HERMANN P. BRETSCH, CHIEF, EMERGENCY READINESS STAFF
CLARKE H. HARPER, DIRECTOR OF BUDGET

Mr. THOMAS. We have with us this morning our friends from the Federal Aviation Agency. Who is with you, Mr. Bretsch?

Mr. BRETSCH. Our budget officer, Mr. Harper.

PREVIOUS FINANCING OF CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. You are looking for $200,000 this year as compared to $121,000 last year.

How much funds have you had for the last 10 years in this activity?

Mr. BRETSCH. This began in 1960, with $78,000.

Mr. THOMAS. You mean you did not get in on the show before 1960?

Mr. BRETSCH. We are a new Agency and do not have a——

Mr. THOMAS. Yes, but your predecessor was in there, wasn't he?

Mr. BRETSCH. No; not in this program.

Mr. THOMAS. You absorbed it, though. You were in the program, your predecessor agency, but you did not have any funds appropriated for this specific purpose.

Mr. BRETSCH. These funds were all devoted to the readiness of the aviation industry and the air transportation industry. We conducted no activities with respect to the industry prior to the end of 1960.

Mr. THOMAS. Haven't you folks been working in this field for about 10 years?

Mr. BRETSCH. Only with respect to the readiness of the Agency itself. None of these funds were used for that purpose.

Mr. THOMAS. That is working in the field, isn't it? How much did you spend on it in, say, 1955? You did not have any directly appropriated funds for the purpose, but you absorbed it out of your regular budget, did you not?

Mr. BRETSCH. In 1955 at most we had about 2 man-years of effort on this.

Mr. THOMAS. Put a table in the record for the last 8 years that shows the amount of money and the number of jobs.

(The information supplied follows:)

Emergency readiness program

Fiscal year	CAA-FAA funding		OCDM funding		Total	
	Positions	Amount	Positions	Amount	Positions	Amount
1955	3	$18,800			3	$18,800
1956	3	19,500			3	19,500
1957	4	33,700			4	33,700
1958	8	55,600			8	55,600
1959	15	85,400			15	85,400
1960	25	277,700	7	$78,000	32	355,700
1961	25	[1] 529,200	12	149,000	37	678,200
1962	32	377,800	13	121,000	45	498,800

[1] Includes $249,000 for the purchase of radiological instruments.

CURRENT AND PROJECTED STAFFING

Mr. THOMAS. How many jobs do you have allocated for this year and how many for 1963 for this particular purpose?

Mr. BRETSCH. For this specific purpose we have 13 jobs for which we are asking $200,000. It is a continuation of the program presently underway in 1962.

Mr. THOMAS. How many did you say?

Mr. BRETSCH. Thirteen positions.

Mr. THOMAS. For 1962 or 1963?

Mr. BRETSCH. 1963.

Mr. THOMAS. How many did you have in 1962?

Mr. BRETSCH. Thirteen.

Mr. THOMAS. Why an increase of $79,000, then?

Mr. BRETSCH. The increase of $79,000 is to put these positions on a full-year basis in the cases where they were not filled during this year——

Mr. THOMAS. In other words, you have been carrying out of your regular budget a part of these costs?

Mr. BRETSCH. No, sir; we established a new region for one thing, which requires us to provide a regional officer for this purpose.

However——

Mr. THOMAS. You have 13 employees in 1962 and 13 in 1963, and you have an increase of $79,000. Where is the increase going, rents and utilities for your new office?

OTHER OBJECTS OF EXPENSE

Mr. BRETSCH. $55,800 of of this is for other objects and some personnel costs.

Mr. THOMAS. What are the other objects?

Mr. BRETSCH. This includes $25,000 for a film, on the decontamination of civil aircraft.

Mr. THOMAS. Where is the other $30,000?

Mr. BRETSCH. $6,000 is an increase in travel funds. $5,440 is for an increase in printing funds.

Mr. THOMAS. Do you have $4,000 or $5,000 in there to furnish that office? How much is that?

Mr. BRETSCH. Increases in supplies and equipment are $3,500.

ABSORPTION OF CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. How many employees do you have in the Agency now?

Mr. HARPER. About 43,000, sir.

Mr. THOMAS. Forty-three thousand employees now. How many are you looking for for 1963?

Mr. HARPER. Forty-seven thousand. We have 43,000 this year.

Mr. THOMAS. How many people do you have now working on this job, 13?

Mr. BRETSCH. We have 13 positions.

Mr. THOMAS. With 43,000 positions you cannot absorb 13?

Mr. BRETSCH. The problem is how we were directed to budget this in past years and a continuation of that function.

JUSTIFICATION OF THE ESTIMATE

Mr. THOMAS. Mr. Reporter, include pages 18 and 19 of the justifications in the record at this point.

(The pages referred to follow:)

Federal Aviation Agency

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
Civil aviation defense functions	$148,754	$121,000	$200,000	+$79,000

The Federal Aviation Agency has the responsibility for preparing and furnishing guidance to the civil aviation industry in the development of plans and programs to maintain that industry in a state of readiness for all degrees of national emergency, including attack upon the United States.

An adequately functioning air transport system, under various possible wartime or emergency conditions, involves full use of the available aircraft, civil airports, aircraft repair stations, and other aviation facilities required for the support of essential aircraft movements. The FAA must, to the maximum extent possible, provide for the continuing availability of civil aviation facilities in support of military requirements, civil defense and defense mobilization, and aircraft movements necessary for survival and rehabilitation efforts.

Insuring the maximum possible availabiilty of civil aviation resources after an attack on the United States requires that appropriate preattack training and protective measures be taken to reduce the vulnerability of civil aviation facilities and personnel, and to minimize the effect of damage to such facilities arising from nuclear attack. This involves the development of plans, procedures,

and technical standards, and the aggressive promotion of training programs and physical measures covering (1) protective actions to be taken by the management of civil aviation facilities prior to a national emergency, (2) the essential survival actions to be taken during and immediately after an attack, and (3) recovery actions to be taken by the management of aviation facilities during the postattack restoration and rehabilitation period.

Information on the actions required and the promotion of requisite responses must be extended to approximately 3,000 general use airports, 250 air-carrier operating and maintenance headquarters, 580 repair stations, 2,200 air agencies and air-taxi operations bases, and more than 1,200 non-Federal civil aviation communication stations and dispatching centers. National level programs for the nonmilitary defense of civil aviation operating assets must be implemented by extensive assistance, encouragement, guidance, and example by the FAA field organization if the civil air transport industry is to maintain a positive state of readiness to perform its vital role in national survival and recovery undertakings if this Nation is attacked.

PROGRAM OBJECTIVES

The estimate of $200,000 will provide during fiscal year 1963 for the continued development and execution of programs to discharge assigned responsibilities for the following civil aviation nonmilitary defense preparations:

Providing technical guidance and leadership to the aviation industry for the protection of essential civil aviation operating facilities against the hazards of nuclear attack and for reducing the vulnerability of essential civil aviation facilities against attack.

Providing technical guidance and leadership to States, counties, municipalities, and others engaged in the operations of public airports and landing areas suitable for use in the event of national emergency, on measures to reduce vulnerability to damage and developing plans for the direction of Federal activities with respect to the emergency clearance and restoration of essential civil airports and other usable landing facilities in damaged areas.

Developing plans, procedures and technical standards to insure the maximum availability and utilization of aircraft airframe, engine, instrument, and other critical repair stations as well as supplementary civil aviation facilities required for the maintenance support of essential aircraft movements for military and civil operations under emergency conditions.

Maintaining liaison with the Office of Civil Defense, DOD, and the OEP at the national and regional levels to insure the coordinated dissemination of nonmilitary defense information and instructions to the owners, managers, and operators of the Nation's civil aviation resources.

Developing plans, procedures and technical standards for the application of the national shelter policy to the Nation's public civil airport facilities.

Within the limitations of funds, equipment, and personnel, fostering and encouraging training and preparatory measures in the radiological defense of civil aviation equipment, facilities and personnel required for the continued operation of essential military and civil air transport services during a national emergency, developing a radiological monitoring capability at such facilities for the national radiological monitoring network, and maintaining the proficiency of FAA radiological monitors in the Federal monitoring network.

REALINEMENT OF TRANSPORTATION FUNCTIONS

Mr. OSTERTAG. We have just listened to representatives of the Commerce Department with regard to their budget for civil defense and they deal with defense transportation. They even have a Defense Air Transportation Administration and a part of their job, of course, is utilization of transportation and planning and priorities, insurance and so on.

Now you are an aviation agency, more or less the regulating agency in air travel and air transportation.

Isn't there a sort of a duplication of effort or purpose as between the Commerce Department and the FAA in the whole field?

Mr. BRETSCH. The President on February 16 issued a new Executive Order 11003, in which he realined some of the functions of the transportation area.

This will result in moving to the FAA some of the responsibilities out of the Defense Air Transportation Administration, particularly those relating to the utilization of non-air-carrier aircraft, of which there are about 70,000 available for the so-called national emergency defense airlift and State emergency defense airlift function.

The Executive orders issued by the President also created in the Department of Commerce a responsibility for planning for total use of transportation resources.

Mr. OSTERTAG. They are responsible for developing long-range programs to integrate the mobilization requirements of all forms of transportation systems, including air, and they have other responsibilities.

All I am concerned about is whether or not this properly belongs to you or how it can be coordinated between two agencies moving somewhat in the same direction and in the same field.

Mr. BRETSCH. The emphasis we are placing in the program and the emphasis they are placing is entirely different.

We are concerned primarily with the fact that in order to have air transportation in an emergency, it is necessary for these facilities to survive. We are basically concerned with the equipment, its location, the aircraft, the people, the repair stations.

Mr. OSTERTAG. But there is a definite relationship, you must admit.

Mr. BRETSCH. That is right.

COORDINATION OF TRANSPORTATION

Mr. OSTERTAG. How is that coordinated? Actually, you have two agencies dealing with the same general field.

Why should this not all be under FAA or why shouldn't it be under Commerce, one or the other? It seems to me in this whole delegation of responsibility it is going to be difficult for the left hand to know what the right hand is doing and how can it ever be put together in case we need it.

I am not trying to be difficult about it. I am merely saying that it strikes me that we have a situation here and when you stop and review this whole aspect of our civil defense program, it is hard to conceive so many programs doing so many things, and how they would ever come out on the surface with any degree of meaning.

Mr. THOMPSON. May I contribute a little bit on this, Mr. Ostertag?

The transportation program, of course, is widely distributed all over the Government. ICC handles rail, trucks, and inland waterway shipping. Maritime has ocean shipping, and the Corps of Engineers has the maintenance of the inland waterways. CAB has air traffic and FAA has airports and navigation, and so on down the line.

Now we have transferred to the Department of Commerce, the coordinating function which was formerly in the Office of Emergency Planning or Office of Civil and Defense Mobilization. We have transferred the central coordinating function to commerce this year to coordinate all modes of transportation, including air.

Air is divided three ways: CAB, which has the passenger traffic surveillance and the FAA has the airports, primarily. DATA in Commerce divides the claims for needs of civilians and military functions between CAB and DOD.

These will all be coordinated by Commerce from here on out. It is now the central coordinating agency in transportation.

Mr. THOMAS. What is your crowd doing all this time in this field?

Mr. THOMPSON. We have been doing this in the past.

Mr. THOMAS. I haven't seen any reduction in your personnel this year.

Mr. RICE. We are reducing from 500 to 450 next year. We are down to just one man at all who can contribute in transportation.

Mr. OSTERTAG. It would seem to me he would be the coordinating agency, but here you point out that Commerce is the coordinating agency in this particular field.

Mr. THOMPSON. By statute Commerce since 1950 has had a coordinating responsibility for all modes of transportation in peacetime and we are assigning them the emergency planning job since they have had that responsibility for peacetime operations.

Mr. OSTERTAG. Is this all geared to postwar attack?

Mr. THOMPSON. This particular assignment is not entirely postwar attack, but it is preparation for limited war as well as general war, of course, general war and the probability of attack and the recovery from such an attack.

Mr. THOMAS. Thank you, gentlemen, very much. You are awfully nice to come over and help us out.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

WITNESSES

DR. JOHN D. PORTERFIELD, DEPUTY SURGEON GENERAL
DR. CARRUTH J. WAGNER, CHIEF, DIVISION OF HEALTH MOBILIZATION
DAVID S. BRUNSON, CHIEF, MEDICAL STOCKPILE BRANCH, DIVISION OF HEALTH MOBILIZATION
RICHARD W. BOWMAN, EXECUTIVE OFFICER, DIVISION OF HEALTH MOBILIZATION
SHELBY T. GREY, DIRECTOR, BUREAU OF PROGRAM PLANNING AND APPRAISAL, FDA
ANDREW R. N. TRUELSON, ASSISTANT DIRECTOR, BUREAU OF FAMILY SERVICES
DEAN SNYDER, DEFENSE COORDINATOR, OFFICE OF THE SECRETARY
LOYAL C. FISHER, ACTING DEPARTMENT BUDGET OFFICER
JOHN W. HAMBLETON, BUDGET ANALYST

Mr. THOMAS. We have with us our very able and distinguished friends here from the Department of Health, Education, and Welfare.

It is certainly nice to have all of you gentlemen here. We are honored to have you.

Dr. Porterfield, do you have a statement for us?

Dr. PORTERFIELD. Yes, I do.

GENERAL STATEMENT

Mr. Chairman and members of the Committee, during the past year a major change has taken place in the assignment of civil defense and emergency preparedness functions. The former OCDM and its functions have been replaced by separate executive order assignments to the Department of Defense, the Office of Emergency Planning, and to each of nine other departments and agencies.

The Department of Health, Education, and Welfare until recently derived its assignments for Emergency Preparedness Orders 4 and 5.

This has now been changed. On August 14, 1961, the President, in Executive Order 10958, directed the Secretary of Health, Education, and Welfare to assume full responsibility for medical stockpile functions and on February 16, 1962, directed the Secretary, in Executive Order 11001, to assume other functions formerly conducted and financed under OCDM authority as covered in EPO 4 and EPO 5. I have copies of the two Executive orders under which we now operate to include in the record if you so desire.

Mr. THOMAS. We will insert them in the record at this point.

(The material referred to follows:)

[Federal Register, Washington, Aug. 16, 1961]

TITLE 3—THE PRESIDENT

EXECUTIVE ORDER 10958. DELEGATING FUNCTIONS RESPECTING CIVIL DEFENSE STOCKPILES OF MEDICAL SUPPLIES AND EQUIPMENT AND FOOD

By virtue of the authority vested in me by Reorganization Plan No. 1 of 1958 (72 Stat. 1799), and as President of the United States, it is ordered as follows:

PART I. MEDICAL STOCKPILES

SECTION 101. *Delegation of functions.* Certain functions under the Federal Civil Defense Act of 1950, as amended (which were transferred to the President by the provisions of Reorganization Plan No. 1 of 1958 (72 Stat. 1799), are hereby delegated to the Secretary of Health, Education, and Welfare, hereafter in this Part referred to as the Secretary, as follows:

(a) All functions (including, as used in this order, powers, duties, and authority) under section 201(h) of that Act, 50 U.S.C. App. 2281(h), to the extent that they pertain to the stockpiling of medical supplies and equipment.

(b) To the extent that they are incidental to or necessary for the performance by or under the Secretary of the functions delegated by the provisions of section 101(a) of this order, other functions under the Federal Civil Defense Act of 1950, as amended, excluding, however, functions under sections 102(a), 201(b), and 402 and Title III of that Act.

SEC. 102. *Redelegation.* The Secretary may redelegate any of the functions delegated to him by this order to any of his subordinates.

PART II. FOOD STOCKPILES

SEC. 201. *Delegation of functions.* Certain functions under the Federal Civil Defense Act of 1950, as amended (which were transferred to the President by the provisions of Reorganization Plan No. 1 of 1958 (72 Stat. 1799), are hereby delegated to the Secretary of Agriculture, hereafter in this Part referred to as the Secretary, as follows:

(a) All functions under section 201(h) of that Act, 50 U.S.C. App. 2281(h), to the extent that they pertain to the stockpiling of food.

(b) To the extent that they are incidental to or necessary for the performance by or under the Secretary of the functions delegated by the provisions of section 201(a) of this order, other functions under the Federal Civil Defense Act of 1950, as amended, excluding, however, functions under sections 102(a), 201(b), and 402 and Title III of that Act.

SEC. 202. *Redelegation.* The Secretary may redelegate any of the functions delegated to him by this order to any of his subordinates.

PART III. GENERAL PROVISIONS

SEC. 301. *Relationships with other agencies.* The responsibilities of the Director of the Office of Civil and Defense Mobilization in respect of the functions delegated by the provisions of Parts I and II of this order shall be those stated in section 2(a) of Executive Order No. 10952 of July 20, 1961 (26 F.R. 6577).

SEC. 302. *Property, personnel, and records.* Subject to law, property, personnel, and records of the Office of Civil and Defense Mobilization shall be transferred as follows:

(a) To the Department of Health, Education, and Welfare, so much thereof, related to the functions delegated by the provisions of Part I of this order, as may be determined jointly by the Secretary of Health, Education, and Welfare and the Director of the said Office.

(b) To the Department of Agriculture, so much thereof, related to the functions delegated by the provisions of Part II of this order, as may be determined jointly by the Secretary of Agriculture and the said Director.

SEC. 303. *Funds.* There shall be transferred to the Department of Agriculture and to the Department of Health, Education, and Welfare so much of the appropriations, allocations, and other funds (available or to be made available) of the Office of Civil and Defense Mobilization as shall be determined in pursuance of the provisions of section 202(b) of the Budget and Accounting Procedures Act of 1950 (31 U.S.C. 581c(b)) and section 1(k) of Executive Order No. 10530 of May 10, 1954.

SEC. 304. *Prior Executive orders.* Exclusive of Executive Order No. 10952 of July 20, 1961, all prior Executive orders (including Executive Order No. 10773 of July 1, 1958, as amended, and Executive Order No. 10902 of January 9, 1961) are hereby superseded to the extent that, immediately prior to the issuance of this order and in respect of the functions delegated by the provisions of Parts I and II of this order (to the extent there delegated), they delegate or otherwise assign, or authorize the delegation or other assignment of, functions or subject, or authorize the subjection of, the performance of functions to supervision, direction, control, or coordination.

SEC. 305. *Other prior actions.* Except to the extent that they may be inconsistent with the provisions of this order, and except to the extent revoked, superseded or otherwise rendered inapplicable before the date of this order, all determinations, authorizations, regulations, rulings, certificates, orders, directives, contracts, agreements, and other actions heretofore made, issued, or entered into with respect to any function delegated by the provisions of Part I or of Part II of this order (to the extent there delegated) shall continue in effect until such time as the Secretary of Health, Education, and Welfare or the Secretary of Agriculture, as the case may be, under the authority of this order, shall amend, modify, or terminate them. The status of prior Executive orders shall be governed by the provisions of section 304 of this order.

JOHN F. KENNEDY

THE WHITE HOUSE, *August 14, 1961.*

[F.R. Doc. 61-7909; Filed, Aug. 15, 1961; 9:51 a.m.]

[Federal Register, Washington,, Feb. 20, 1962]

EXECUTIVE ORDER 11001. ASSIGNING EMERGENCY PREPAREDNESS FUNCTIONS TO THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE

By virtue of the authority vested in me as President of the United States, including authority vested in me by Reorganization Plan No. 1 of 1958, it is hereby ordered as follows:

SECTION 1. *Scope.* The Secretary of Health, Education, and Welfare (hereinafter referred to as the Secretary) shall prepare national emergency plans and develop preparedness programs covering health services, civilian health manpower, health resources, welfare services, and educational programs as defined below. These plans and programs shall be designed to develop a state of readiness in these areas with respect to all conditions of national emergency including attack upon the United States.

SEC. 2. *Definitions.* As used in this order:

(a) "Emergency health services" means medical and dental care for the civilian population in all of their specialties and adjunct therapeutic fields, and the planning, provision and operation of first aid stations, hospitals, and clinics; preventive health services, including detection, identification and control of communicable diseases, their vectors, and other public health hazards, inspection and control of purity and safety of food, drugs and biologicals; food and milk sanitation; public water supplies; sewage and other waste disposal; registration and disposal of the dead; prevention and alleviation of water pollution; vital statistics services; preventive and curative care related to human exposure to radiological, chemical, and biological warfare agents; and rehabilitation and related services for disabled survivors. It shall be understood that health services, for the purposes of this order, do not encompass the following areas for which the Department of Agriculture has responsibility; plant and animal diseases and pest prevention, control and eradication, protection of meat and meat products, and poultry and poultry products in establishments under continuous inspection service by the Department of Agriculture, veterinary biologicals, agricultural commodities and products owned by the Commodity Credit Corporation or the Secretary of Agriculture, livestock, agricultural commodities owned or harvestable on farms and ranches, agricultural lands, and registration of pesticides.

(b) "Health manpower" means physicians (including osteopaths); dentists; sanitary engineers; registered professional nurses; and such other occupations as may be included in the List of Health Manpower Occupations issued for the purposes of this Executive Order by the Director of the Office of Emergency Planning after agreement by the Secretary of Labor and the Secretary of Health, Education, and Welfare.

(c) "Health resources" means manpower, material, and facilities required to prevent the impairment of, improve, and restore the physical and mental health conditions of the civilian population.

(d) "Emergency welfare services" means feeding; clothing; housing or lodging in private and congregate facilities; registration; locating and reuniting families; care of unacompanied children, the aged, the handicapped, and other groups needing specialized care or service; necessary financial or other assistance; counseling and referral services to families and individuals; aid to welfare institutions under national emergency or post-attack conditions; and all other feasible welfare aid and services to people in need during a civil defense emergency. Such measure include organization, direction, and provision of services to be instituted before attack, in the event of strategic or tactical evaluation, and after attack in the event of evacuation or of refuge in shelters.

(e) "Education," as used in this order, means the utilization of formal public and private school systems, from elementary through college, for the dissemination of instructional material guidance, and training in the protection of life and property from enemy attack.

SEC. 3. *Health Functions.* With respect to emergency health services, as defined above, and in consonance with national civil defense plans, programs and operations of the Department of Defense under Executive Order No. 10952, the Secretary shall:

(a) *National program guidance.* Develop plans and issue guidance designed to utilize to the maximum extent the existing civilian health resources of the Federal Government, and with their active participation, assistance, and consent, the health resources of the States and local political subdivisions thereof, and of other civilian organizations and agencies concerned with the health of the population, under all conditions of national emergency. Maintain relations with health professions and institutions to foster mutual understanding of Federal emergency plans which affect health activities.

(b) *Professional training.* Develop and direct a nationwide program to train health manpower both in professional and technical ocupational content and in civil defense knowledge and skills. Develop and distribute health education material for inclusion in the curricula of schools, colleges, professional schools, government schools, and other educational facilities throughout the United States. Develop and distribute civil defense information relative to health services to States, voluntary agencies and professional groups.

(c) *Emergency water supply.* Prepare plans to assure the provision of usable public water supplies for essential community uses in an emergency. This shall include inventorying existing supplies, developing new sources, performing research, setting standards, and planning distribution. In carrying on these activities, the Department shall have primary responsibility but will make maximum

use of the resources and competence of State and local authorities and of other Federal agencies.

(d) *Radiation.* Develop and coordinate programs of radiation measurement and assessment as may be necessary to carry out the responsibilities involved in the provision of emergency health services.

(e) *Biological and chemical warfare.* Develop and coordinate programs for the prevention, detection, and identification of human exposure to chemical and biological warfare agents as may be necessary to carry out the responsibilities involved in the provision of emergency health services including the provision of guidance and consultation to Federal, State, and local authorities on measures for minimizing the effects of biological or chemical warfare.

(f) *Foods, drugs, and biologicals.* Plan and direct national programs for the maintenance of purity and safety in the manufacture and distribution of food, drugs, and biologicals in an emergency.

(g) *Disabled survivors.* Prepare national plans for emergency operations of vocational rehabilitation and related agencies, and for measures and resources necessary to rehabilitate and make available for employment those disabled persons among the surviving population.

(h) *Salvage and rehabilitation.* Develop plans for salvage of supplies and equipment and rehabilitation of health services, supplies, and facilities after attack.

SEC. 4. *Welfare Functions.* With respect to emergency welfare services as defined above, and in consonance with national civil defense plans, programs and operations of the Department of Defense under Executive Order No. 10952, the Secretary shall:

(a) *National program guidance.* Develop plans and issue guidance for an integrated national program for emergency welfare services and, working with other Federal departments and agencies, provide for extending guidance and technical assistance to State and local welfare departments in the development and operation of their plans for the community organization of emergency welfare services.

(b) *Federal support.* Cooperate to the development of Federal support procedures, through joint planning with other departments and agencies, including but not limited to the Post Office Department, the Department of Labor, and the Selective Service System, the Housing and Home Finance Agency, and resource agencies including the Department of Agriculture, the Department of the Interior, and the Department of Commerce for logistic support of State and community welfare services in an emergency.

(c) *Emergency welfare training.* Develop and direct a nationwide program to train emergency welfare manpower for the execution of the functions set forth in this order, develop welfare educational materials, including self-help program materials for use with welfare organizations and professional schools, and develop and distribute civil defense information relative to emergency welfare services to States, voluntary agencies, and professional groups.

(d) *Financial aid.* Develop plans and procedures for financial assistance to individuals injured or in want as a result of enemy attack and for welfare institutions in need of such assistance in an emergency.

(e) *Professional liaison.* Maintain relations with national voluntary welfare organizations and related national professional and business organizations to foster mutual understanding and support of emergency welfare plans and activities.

SEC. 5. *Education Functions.* With respect to education as defined above, and in consonance with national civil defense plans, programs and operations of the Department of Defense under Executive Order No. 10952, the Secretary shall develop and issue through appropriate channels instructional materials and provide suggestions and guidance to assist schools, colleges, and other educational agencies to incorporate emergency protective measures and long-range civil defense concepts into their programs. This involves assistance to various levels of education to develop an understanding of the role of the individual, family, and community for civil defense in the nuclear age, as well as the maintenance of relations with educators, national and State education associations, foundations, and other related organizations to foster mutual understanding and support of civil defense activities.

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SEC. 6. *Facilities Protection and Damage Assessment.* In consonance with the national civil defense plans, programs and operations of the Department of Defense under Executive Order No. 10952, the Secretary shall:

(a) *Facilities protection.* Provide industry protection guidance material adapted to the needs of health, welfare, and education facilities and promote a national program to stimulate, guide, and assist facilities such as hospitals, clinics, public water plants, waste disposal plants and facilities for other emergency health services, welfare institutions, and schools in methods of disaster preparedness and control in order to minimize the effects of overt or covert attack and maintain continuity of capacity to serve the public in an emergency. Guidance and assistance shall include but not be limited to: organizing and training facility employees, employee shelter, evacuation plans, records protection, continuity of management, emergency repair, deconcentration of dispersal of facilities, and the organization of mutual aid associations for emergency.

(b) *Damage assessment.* Maintain a capability to assess the effects of attack on health, welfare, and education facilities and personnel both at national and field levels and provide data to the Department of Defense.

SEC. 7. *Resources.* The Secretary shall periodically assess assigned resources available from all sources in order to estimate availability under an emergency situation, analyze resource estimates in relation to estimated requirements in order to identify problem areas and develop appropriate recommendations and programs. Provide data and assistance before and after attack for national resource evaluation purposes of the Office of Emergency Planning.

SEC. 8. *Relative Urgencies.* The Secretary shall develop standards and relative urgencies for emergency health and welfare services for guidance of Federal agencies, States, and communities in providing maximum protection to survivors, and for the purpose of conserving, improving availability, and allocating such resources.

SEC. 9. *Requirements.* The Secretary shall periodically assemble, develop as appropriate, and evaluate requirements for assigned resources and services, taking into account the estimated needs for military as well as civilian purposes. Such evaluations shall take into consideration the geographical distribution of requirements under emergency conditions.

SEC. 10. *Claimancy.* The Secretary shall prepare plans to claim materials, manpower, equipment, supplies and services needed to carry out assigned responsibilities and other essential functions of the Department, from the appropriate agency and work with such agencies in developing programs to insure availability of such resources in an emergency.

SEC. 11. *Stockpiles.* The Secretary shall assist the Office of Emergency Planning in formulating and carrying out stockpiling of strategic and critical materials and survival items. The Secretary shall also plan and direct the procurement, storage, maintenance, inspection, survey, distribution, and utilization of essential supplies and equipment for emergency health services.

SEC. 12. *Research.* Within the framework of Federal research objectives, the Secretary shall supervise or conduct research in areas directly concerned with carrying out emergency preparedness responsibilities for health, education, and welfare programs. With respect to the emergency health and welfare services assignment, this is defined as, but not limited to (1) development of medical means for the prevention and care of casualties (including those from thermonuclear weapons, radiation exposure, and biological and chemical warfare, as well as from other weapons); (2) research in preventive medicines, basic biology and environmental sanitation directed to maintaining the health of noncasualty population; (3) pre-attack and post-attack target research in health services; (4) protection of resources and protocol essential to carrying out long-term basic and applied research in the post-attack period; and (5) the development of techniques for the most efficient utilization of civilian health manpower. Designate representatives for necessary ad hoc or task force groups and provide advice and assistance to other agencies in planning for research in areas involving the Department's interest.

SEC. 13. *Functional Guidance.* The Secretary, in carrying out the functions assigned in this order, shall be guided by the following:

(a) *Interagency cooperation.* The Secretary shall assume the initiative in developing joint plans for the coordination of emergency civilian health services and welfare services programs of those departments and agencies which have responsibility for any segment of such activities. He shall utilize to the maximum those capabilities of other agencies qualified to perform or assist in the performance of assigned functions by contractual or other agreements.

(b) *Presidential coordination.* The Director of the Office of Emergency Planning shall advise and assist the President in determining policy for, and assist him in coordinating the performance of functions under this order with the total national preparednes program.

(c) *Emergency planning.* Emergency plans and programs, and emergency organization structure required thereby, shall be developed as an integral part of the continuing activities of the Department of Health, Education, and Welfare on the basis that it will have the responsibility for carrying out such programs during an emergency. The Secretary shall be prepared to implement all appropriate plans developed under this order. Modifications and temporary organization changes, based on emergency conditions, will be in accordance with policy determination by the President.

SEC. 14. *Emergency Actions.* Nothing in this order shall be construed as conferring authority under Title III of the Federal Civil Defense Act of 1950, as amended, or otherwise, to put into effect any emergency plan, procedure, policy, program, or course of action prepared or developed pursuant to this order. Such authority is reserved to the President.

SEC. 15. *Redelegation.* The Secretary is hereby authorized to redelegate within the Department of Health, Education, and Welfare the functions hereinabove assigned to him.

SEC. 16 *Prior Actions.* To the extent of any inconsistency between the provisions of any prior order and the provisions of this order, the latter shall control. Emergency Preparedness Orders Nos. 4 and 5 (heretofore issued by the Director, Office of Civil and Defense Mobilization) (26 F.R. 656–658), are hereby revoked.

JOHN F. KENNEDY

THE WHITE HOUSE, *February 16, 1962.*

[F.R. Doc. 62–1807; Filed, Feb. 19, 1962; 10:47 a.m.]

Dr. PORTERFIELD. The White House statement issued at the time of the announcement of the new Executive orders last month stated in part:

> The assignment of emergency preparedness responsibilities to various agencies reflects the policy expressed in law that maximum use should be made of the regular departments and agencies in carrying out emergency preparedness programs. This approach is designed to achieve maximum effectiveness and efficiency through building into the ongoing programs of the agencies an emergency preparedness capability.

The President's budget for fiscal year 1963 includes funds for the conduct of these assignments in the regular appropriation estimates of the operating agencies of the Department. These separate agency estimates have been compiled into a single Department estimate in keeping with our understanding of the committee's wishes. The total is $42,106,000. Of this amount, $41,445,000, or 98.4 percent, represents emergency health activities, including $40 million for medical stockpile procurement and related resources management and planning.

If I may at this point inject in my statement a recapitulation to clarify the base about which we are talking.

With these various transfers and shifts due to the new Executive orders, we must relate a 1962 base of $35,864,000 for stockpiling, to a request for 1963 of $40 million. For the delegate agency operations which HEW is expected to carry out, we are now asking for $2,106,000 as compared to a base in 1962 of $1,483,000.

The Department places highest priority upon the responsibility contained within its Executive orders for postattack and welfare readiness at the community level—both during the shelter period and the postshelter period. For this purpose, the Department is in partnership with the Office of Civil Defense under Secretary Pittman who,

in turn, looks to us for civil defense health and welfare capability as contained in our estimates, rather than to duplicate the same capability within the Defense Department estimates.

Since the predominant portion of the funds requested is for the Public Health Service, the Secretary has again asked that I present the total Department program.

I will begin with a discussion of health preparedness and of the programs needed to advance our readiness posture in line with the President's assignments to us.

EMERGENCY HEALTH ACTIVITIES

The only absolute protection against modern warfare is to prevent its occurrence, but as long as the threat exists, the United States must reach and maintain a maximum potential of survival and ability to recover. The devastation and chaos made possible by present day weapons is massive. Use of these weapons would produce millions of fatalities and, in addition, millions of civilian casualties urgently in need of medical care. In developing measures to meet such a catastrophe, health resources are the foundation upon which survival and recovery plans must be based.

The goal of the Public Health Service is to prepare a readiness program that will assure to the greatest possible extent that the health needs of the civilian population will be met in the event of a national disaster. This entails effective mobilization and utilization of all the health resources of the Nation. Moreover, this entails the achievement of emergency health preparedness on a community basis. To attain maximum preparedness, each community must—

(1) Train the people in medical self-help and give them the ability to take care of their own health needs when deprived of the services of a physician;

(2) Develop a capability for the most effective use of the available health manpower;

(3) Develop a capability for the most effective emergency use of all available hospital and health facilities;

(4) Develop a capability for the most effective management of all available medical supplies and equipment;

(5) Develop a capability to provide an emergency supply of potable water; and

(6) Develop standby plans for the rehabilitation of damaged health services facilities and restoration of peacetime standards of medical care and sanitation.

MEDICAL STOCKPILE

Executive order 10958 delegates responsibilities for the civilian stockpile of emergency medical supplies and equipment to the Secretary of Health, Education, and Welfare. The medical stockpile program goal is to have adequate medical supplies and equipment available for civilian needs at the community level in the event of a national emergency. However, building and maintaining civil defense medical supply and equipment inventories in itself is not sufficient. Stockpiling must be accompanied by a program of organizing and train-

ing local health manpower in the most efficient and prudent use of available medical supplies and equipment under disaster conditions.

It would be futile to create a medical stockpile and preposition emergency hospitals without developing the ability to use this resource to the best advantage in the time of emergency. The justification, therefore, contains estimates for emergency health training and community preparedness. Two programs will serve to illustrate what I mean, namely, the medical self-help program and the program for expanded training of allied health personnel.

MEDICAL SELF-HELP TRAINING PROGRAM

The budget before you for consideration accelerates the training program for communities. A major effort for this purpose involves the medical self-help program developed by the Public Health Service and initiated in January 1962, to teach American families how to survive a national emergency and how to manage their own health needs when deprived of a physician's services. The program is predicated on the probability that individuals and small family groups will be isolated for extended periods of time after an attack both in the shelter period and the postshelter period; that radioactive fallout will delay resumption of organized health services; that the physician population may be reduced to half its present size; and that the requirement for professional services and other health resources by the casualty and noncasualty survivors will exceed many times the capability of the community to provide these services and resources in the usual manner. This self-help program supplements and does not replace in any way the American National Red Cross program of first aid and home nursing. Medical self-help is fully endorsed by the American Medical Association, American Osteopathic Association, and a number of allied medical professional associations.

Medical self-help training will be provided through (1) the use of a training kit containing a technical guide, printed lessons with illustrative slides, slide projector, screen, student handouts, and test forms, and (2) the use of a manual entitled "Family Guide—Emergency Health Care." The training course covers eight 2-hour sessions and includes 12 lesson topics: Radioactive fallout and shelter; hygiene, sanitation and vermin control; water and food; shock; bleeding and bandaging; artificial respiration; fractures and splinting; transportation of the injured; burns; nursing care of the sick and injured; infant and child care; emergency childbirth.

The goal of the medical self-help program is to train 50 million Americans in a minimum possible time. Present projections are to train 300,000 persons during the remainder of this fiscal year, 5 million during fiscal year 1963, and 10 million each fiscal year thereafter.

Although medical self-help is essential to survival, it is only an interim measure. The reestablishment of organized community health services as quickly as possible postattack is the ultimate emergency health objective. To achieve this objective, the community must develop realistic plans, organize resources, assign responsibilities, devise unique methods of providing medical care, and train personnel. It is this requirement for unique methods of providing medical care and the necessity of training allied health personnel in expanded functions that I would like to present in some detail.

EXPANDED TRAINING OF ALLIED HEALTH PERSONNEL

A basic requirement of the community health preparedness program is overcoming the postdisaster disparity between numbers of sick and injured requiring immeidate medical care and the numbers of physicians available to provide treatment. The most effective method of overcoming this disparity is by expanding the responsibilities of the allied health professional to include the performance of medical, surgical, and environmental health procedures not normally a part of their everyday practice in peacetime. In this way and by this method, the physician's services can be extended to a much larger number of patients. Let me illustrate: in normal practice, the physician diagnoses disease, prescribes treatment and personally performs the more intricate procedures, such as cleaning wounds, suturing lacerations, applying plaster splints, administering intravenous fluids, etc. In a major disaster, nurses and other allied health personnel will have to be prepared to examine patients and institute many of these procedures with only general supervision and direction by the physician. In order for them to accept this responsibility, standardized medical procedures must be developed and prescribed by the physician and the allied health worker must be provided adequate training in the performance of these procedures. Only in this way can the "hand" of the physician be applied to the great number of patients who will require his care and only in this way can the disparity between the number of physicians available and the need for their services be overcome.

Along with the development of standardized emergency treatment procedures and the development and refinement of a community emergency health plan workbook—which will be undertaken by the Public Health Service staff during 1963—determination of the additional or expanded functions appropriate for various categories of health personnel will also be made and training courses for each of the allied medical groups developed. These training courses will be prepared for presentation at the State and local level for the specific purpose of increasing community preparedness.

EMERGENCY HEALTH REQUEST FOR FISCAL YEAR 1963

The Public Health Service estimate of $41,445,000 provides (1) $40 million for the medical stockpile, an increase of $4,136,000 and (2) $1,445,000 for emergency health training and community preparedness, an increase of $544,000. The $40 million for the medical stockpile will provide for the acquisition of an additional 750 civil defense emergency hospitals, increasing the total to 3,432. During 1963, significant headway will be made in the replacement of medical supplies and equipment which have deteriorated beyond usability both in warehouse stock and in prepositioned civil defense emergency hospitals that were acquired between 1952 and 1957.

The increase of $4,136,000 provides for transportation of materials and hospitals procured in 1962 to prepositioned community sites, relocation of stocks, reconditioning of 400 existing prepositioned hospitals, and the costs necessary in connection with maintenance and reworking of materials in depots and in manufacturers' custody.

For example, during 1963, reprocessing of serum albumin stocks will be required to reduce the accumulated deterioration and to restore the original stock to a usable condition with a 10-year dating period.

Within the increase of $544,000 for emergency health training and community preparedness an amount of $250,000 is being requested for regional and State personnel assignments. It is esential that we assign health program specialists (public health advisers) to 21 States, bringing the total to 32 States and the District of Columbia. These specialists will provide staff services to communities in developing and instituting emergency health measures that will insure the most efficient use of available health resources. They will assist the State in the stimulation, development, and activation of emergency health plans for the civilian population under all conditions of disaster and national emergency. Experience in States where these personnel have been assigned demonstrates that they are extremely effective in developing emergency health preparedness capability into communities throughout the State.

In fiscal year 1963 it is also proposed to assign a resources management officer to eight of the DHEW regional offices to provide guidance and assistance the States acutely need in planning, acquiring, and maintaining emergency health resources. Resources management includes location and maintenance of prepositioned civil defense emergency hospitals, development of plans and administrative procedures for use of established health facilities in emergencies, determination of community emergency medical supplies and equipment needs, and assessment of community emergency health manpower requirements.

Increased program emphasis on training contained within this request for 1963 includes not only the extension of the medical self-help program to additional areas and development of expanded function capability in allied health personnel as has been previously outlined, but also training of health teams in the most effective use of civil defense hospitals and the establishment of community emergency health plans. The production of a wide variety of instructional material and training aids is planned. An increase of $235,000 is being requested for these training activities.

An increase of $70,000 is requested for Program Planning and Technical Services that will make possible the: (1) Development of an emergency blood program plan that will insure adequate supplies for mass casualty care; (2) expansion and coordination of a ready reserve program through which the Public Health Service will select and train specialized health personnel to assist in States and local communities in emergency health services planning and training; and (3) Initiation of continuous program evaluation to insure effectiveness of emergency health preparedness at all levels.

An increase of $9,000 is requested for the medical education for national defense program. This activity provides grants to assist 86 medical schools to incorporate disaster training in their curriculums.

In summary, the Public Health Service is dedicated to the goal of attaining the most effective emergency health capability among our entire population. We fully recognize the health problems imposed by major disaster and the difficulty of developing and implementing effective measures to overcome these problems. Providing the Nation with the maximum capability to survive and recover from an enemy attack significantly strengthens our potential.

OTHER PROGRAMS

This concludes the Public Health Service portion which, as stated earlier, is 98 percent of the total requested under the two Executive orders addressed to the Secretary. The remainder of the estimate, although small in amount, represents essential continuing programs for acceleration of civil defense readiness in (1) emergency food and drug protection and (2) emergency welfare services. Funds are also included to support the necessary field planning through our regional offices and for direction and coordination in the Secretary's office. All these activities are conducted in close day-to-day partnership with the Defense Department, both at headquarters and in our regional offices.

FOOD AND DRUG ACTIVITIES

Under Executive Order 11001, the Secretary, DHEW, is responsible for a program to protect purity and safety of food, drugs and biologicals in an emergency. As in peacetime, close cooperation between Federal, State, and local food and drug officials and the food and drug industries is necessary to achieve this goal. They will be unable to perform this mission without being made sufficiently aware, preattack, of the effects of radiological, biological, and chemical warfare on foods and drugs. Two continuing activities are involved totaling $120,000 to be expended by the Food and Drug Administration.

TRAINING PROGRAM

Since February 1960, we have held 75 civil defense training courses during which a total of 2,403 food and drug officials received firsthand information, including actual participation in workshops, calibration of instruments and elementary lessons in decontamination dealing with the complexities of protecting the food and drug supply.

Our ultimate goal is to train all Federal, State, and local food and drug officials, and responsible members of the food and drug manufacturing and distributing industries in the toxic effects of chemical, biological, and radiological warfare agents on foods and drugs and to prepare them to take adequate pre- and postattack protective action. Initial training and periodic refresher courses to assure operational capability are required for this purpose.

BIOLOGICAL RESEARCH PROGRAM

The purpose here is to conduct scientific tests to determine the vulnerability of selected foods and drugs to contamination by biological and chemical agents, the health hazards resulting from such contamination, and to develop practical procedures for the decontamination or salvage of contaminated stocks. This is a continuing program with current funds for two bacteriologists. Laboratory work is underway involving vulnerability studies on five basic foods. The 1963 program would be expanded to seven basic foods and five potential contaminating agents which an enemy might use.

EMERGENCY WELFARE ACTIVITIES

Every local community needs to prepare for postattack emergency welfare service, even though it may never have to put the full program, or even any part of it, into operation. Since there might be little or no warning before attack and it cannot be foreseen where bombs would drop or fallout become dangerous, planning must be based on assumptions such as the following: Any locality might be hit; any locality might be isolated for an indefinite period.

Under Executive order 11001, the Secretary is responsible for preparing national emergency plans and preparedness programs to help insure that the homeless and others in need of assistance as a result of enemy attack or threat will have essential survival aid and services, for example, lodging, feeding, clothing, help in locating and reuniting families, care of groups needing special services such as children separated from their parents, aged and handicapped persons, and temporary financial assistance, if required.

This assignment for which $338,000 is included in this estimate, involves the preparation and field testing of guidance materials for the local welfare agencies as part of postattack emergency government and technical help and training assistance to the State welfare agencies and to national voluntary welfare agencies in emergency welfare methods and procedures. The Department works closely in developing emergency welfare plans with the Office of Civil Defense, Department of Defense, in order that this program may be appropriately planned to cover both the shelter and post-shelter phases of the immediate survival period. Planning is underway to make field studies of typical communities to determine emergency welfare standards for community shelter occupants and the expanded need for auxiliary personnel in the immediate post attack period to perform emergency welfare duties.

The estimate includes a request for four additional regional positions. These are primarily needed to assist in working with the States.

The foregoing discussion has covered basic substantive elements of emergency preparedness for which we have requested funds in the fiscal year 1963. We shall be happy to answer any questions you may have. Dr. C. J. Wagner, Chief of our Health Mobilization Division, Mr. Shelby Grey of the Food and Drug Administration, and Mr. Andrew Truelson who is responsible for our emergency welfare activities, are here with me, and I will ask them to elaborate on the operating details of questions in the area of their specific competence.

Thank you, sir, for the opportunity of presenting this statement.

Mr. THOMAS. That was an excellent statement. That was as good as we have heard from anyone. It was very succinct and to the point.

Summary of HEW Estimate

We will insert in the record at this point pages 23, 24, 25, 26, and 27. (The pages referred to follow:)

Summary Statement

Amounts available for obligation

Appropriation:	
1962	$13,000,000
Transferred from:	
"Salaries and expenses, Office of Emergency Planning"	270,000
"Emergency supplies and equipment, Office of Emergency Planning"	22,162,547
Comparative transfer for functions funded in 1962 under the Office of Emergency Planning and Office of Civil Defense, Department of Defense	1,914,453
Total	37,347,000
1963	42,106,000

Obligations by activity

Description	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Amount	Positions	Amount	Positions	Amount
Emergency health services	155	$36,765,000	195	$41,445,000	+40	+$4,680,000
Food and drug activities	11	105,000	11	120,000		+15,000
Emergency welfare services	25	290,000	29	338,000	+4	+48,000
Field planning	12	136,000	12	150,000		+14,000
Executive direction and coordination	6	51,000	6	53,000		+2,000
Total obligations	209	37,347,000	253	42,106,000	+44	+4,759,000

Obligations by object

	Estimate 1962	Estimate 1963	Increase (+) or decrease (−)
Total number of permanent positions	209	253	+44
Full-time equivalent of all other positions	6	11	+5
Average number of all employees	207	257	+50
Number of employees at end of year	202	250	+48
Personnel compensation:			
Permanent positions	$1,544,699	$1,909,032	+$364,333
Positions other than permanent	58,000	95,000	+37,000
Other personnel compensation	29,200	43,200	+14,000
Total, personnel compensation	1,631,899	2,047,232	+415,333
Personnel benefits	142,441	157,108	+14,667
Travel and transportation of persons	133,120	197,220	+64,100
Transportation of things	505,100	1,943,600	+1,438,500
Rents, communications, and utilities	34,140	43,340	+9,200
Printing and reproduction	20,100	48,100	+28,000
Other services	25,100	65,100	+40,000
Services of other agencies	3,322,000	6,083,000	+2,761,000
Supplies and materials	17,249,600	13,818,800	−3,430,800
Equipment	14,103,500	17,513,500	+3,410,000
Grants, subsidies, and contributions	180,000	189,000	+9,000
Total	37,347,000	42,106,000	+4,759,000

Summary of changes

1962 enacted appropriation		$13,000,000
Transferred from—		
"Salaries and expenses, Office of Emergency Planning"		270,000
"Emergency supplies and equipment, Office of Emergency Planning"		22,162,547
Add: Comparable transfer for functions funded in 1962 under the Office of Emergency Planning and the Office of Civil Defense, Department of Defense		1,914,453
Total estimated obligations, 1962		37,347,000
1963 estimated obligations		42,106,000
Total change		4,759,000
Emergency health services:		
Increases:		
a. Built-in:		
1. Annualization of contractual services with GSA: Inspection teams—medical stockpile (66 positions authorized in 1962 for 65 percent of year)		$172,000
2. Annualization of medical stockpile management:		
Personnel compensation and benefits (13 positions authorized in 1962 for approximately 50 percent of year)	$35,000	
Other related costs	30,000	
		65,000
Subtotal, built-in		237,000
b. Program increases:		
1. Procurement program—medical stockpile:		
Acquisition of 750 civil defense hospitals	$25,500,000	
Replacement of deteriorated materials	5,750,000	
		31,250,000
2. To provide for increased costs in the maintenance and reworking of materials in depots and in manufacturer's custody		1,015,000
3. For expansion of quality control, surveillance, sampling, and testing of depot and prepositioned hospitals		250,000
4. For transportation of materials, relocation of stocks and hospitals to prepositioned sites		1,424,000
5. For expansion of depot management and operating expenses, including underground storage, inspection, inventory, maintenance, and reconditioning of prepositioned hospitals	$1,167,000	
Personnel compensation	4,000	
		1,171,000
6. To expand and strengthen planning and administration (stockpile management):		
Personnel compensation and benefits (5 positions)	26,000	
Reduction in lapse to provide greater employment in existing positions and related personnel benefits	10,000	
Other objects	68,000	
		104,000
7. To expand and strengthen the emergency health training and community preparedness activity:		
Regional and State assignments:		
Personnel compensation and benefits (29 positions)	198,000	
Other objects	52,000	
		250,000
Training:		
Personnel compensation and benefits (5 positions)	30,000	
Contract with Communicable Disease Center	40,000	
Call to duty of Inactive Reserve Corps	40,000	
Training material and course costs	125,000	
		235,000
Program Planning and Technical Service:		
Personnel compensation and benefits (3 positions)	40,000	
Other objects	30,000	
		70,000
Medical education for national defense		9,000
Subtotal, program increases		35,778,000
Gross increases		36,015,000

Summary of changes—Continued

Emergency health services—Continued		
Decreases:		
a. 1962 procurement program—medical stockpile		$31,315,000
b. Nonrecurring costs for casualty rehabilitation		20,000
Total net change requested, Emergency Health Services		4,680,000
Food and drug activities: *a.* Program increases: 1. Funds needed to place certain of staff filled for only part year, 1962, on a full-year basis		+15,000
Emergency welfare services:		
Increases: *a.* Program increases:		
1. To provide additional regional resources for emergency welfare service responsibility:		
Personnel compensation (4 positions)	$32,000	
Other related costs	5,000	
		37,000
2. Additional funds for printing and reproduction		12,000
Subtotal, program increases (gross increase)		49,000
Decreases: *a.* Nonrecurring equipment		1,000
Total net change requested, Emergency Welfare Services		48,000
Field planning: *a.* Program increases: 1. Reduction in lapse rate to allow for full annual salaries of positions filled by retired annuitants		14,000
Executive direction and coordination: *a.* Program increases: 1. Lapse adjustment to place one secretarial position authorized for half-year on full-year basis in 1963		+2,000
Total change, all activities		4,759,000

Mr. THOMAS. You have had transferred to HEW by a recent Executive Order, which has already been placed in the record, the procurement and stockpiling of medical supplies and materials. Beyond that, you have your same duties dealing with bomb blast and radiation effects that you have had for some 10 years.

Dollarwise, last year you had $36,765,000 for stockpiling critical materials, hospital supplies, and so forth, and this year you want to increase that amount to $41,445,000, which is an increase of $4,680,000. Is that correct?

Dr. PORTERFIELD. Including emergency health training and community preparedness, that is correct.

EMERGENCY HEALTH AND WELFARE APPROPRIATION HISTORY

Mr. THOMAS. Beyond your stockpiling of your hospital supplies and medicines and all the other costs that goes with them, you have a budget in 1963 of $42,106,000 against $37,347,000 in 1962, which is an increase of $4,759,000. In round figures, how much money do you have in this budget over and beyond your stockpiling and maintenance of your medical supplies?

Dr. PORTERFIELD. $2,106,000, which also includes welfare funds.

Mr. THOMAS. At this point in the record, detail by years for the last 8 or 9 years just how much money you have spent in those prior years for those activities which total for the fiscal year 1963 $2,106,000. That is excluding the stockpiling of your medical supplies.

Can you read that in the record now?

Dr. PORTERFIELD. The emergency health and welfare services budget, beginning with fiscal year 1955, $1 million; in 1956, $1,240,000; for 1957, $2,340,000; no appropriation in 1958; $80,000 in 1959; $1,495,000 in 1960; $1,679,000 in 1961. Our budget for 1962, comparable, for emergency health and welfare services is $1,483,000.

Mr. THOMAS. And those were specific appropriations for that specific purpose, and they were not included in your regular budget?

Dr. PORTERFIELD. That is correct, sir.

EMERGENCY HEALTH AND WELFARE EMPLOYMENT

Mr. THOMAS. For those specific purposes that you have just detailed for since 1955, and for which you request $2,106,000 for 1963, what was your personnel load? You set it out on page 24—209 for 1962 and 253 for 1963. Are those personnel included in your stockpiling of medical supplies? Are those personnel carried directly in that appropriation?

Mr. HAMBLETON. Of the 209 in 1962, 86 of those are for the stockpile program.

Mr. THOMAS. We will get into stockpiling in a minute. Give us now since 1955 how many employees you have had by years for your emergency activities. That excludes your stockpiling.

Mr. HAMBLETON. In 1955, we had 158; in 1956, 151; 1957, 253; 1958, nothing; 1959, 12; 1960, 153; 1961, 129 1962, 123.

Mr. THOMAS. Thank you, sir. That is very helpful.

INCREASE IN EMPLOYMENT

What increase do you show for those activities this year over last year, jobwise? Repeat your 1962 and 1963 figures again.

Mr. HAMBLETON. The 1962 figure was 123. In 1963, it is 162.

Mr. THOMAS. That is an increase of about 39?

Mr. HAMBLETON. Thirty-nine, correct.

Mr. THOMAS. What are you going to do this year in these particular fields now that you have not been doing for the last 7 or 8 years? Anything new?

Dr. PORTERFIELD. It is not so much new. There are a few new things, but the principal increase in positions is for expanding our assignment of health program specialists to States, one to each State. We have now——

Mr. THOMAS. Let's stay with jobs and then we will go into functions. You have to relate the two, of course.

Dr. PORTERFIELD. Yes.

Mr. THOMAS. You have an increase in round figures of 40 jobs in 1963 over 1962.

GRANTS FOR TRAINING PERSONNEL

What functions are these 40 people going to engage in over and above what you did last year. One of your big things is grants to States for training personnel. That is one of your new activities.

Dr. PORTERFIELD. Technical assistance rather than grants is one of our expanded activities, the training in States and communities——

Mr. THOMAS. Is that a 100-percent grant to colleges and universities?

Dr. PORTERFIELD. This is not in terms of a grant.

Mr. THOMAS. I thought I heard you say a while ago you were training with some grant money. I misunderstood you.

Dr. PORTERFIELD. The only grant I mentioned was the grant to medical schools for the training of medical students.

Mr. THOMAS. How much is that?

Dr. PORTERFIELD. $189,000.

Mr. THOMAS. How many medical schools?
Dr. PORTERFIELD. Eighty-six.
Mr. THOMAS. How many people are you going to train?
Dr. PORTERFIELD. It would be close to 9,000 medical students.
Mr. THOMAS. The graduating class then?
Dr. PORTERFIELD. Yes.
Mr. THOMAS. What is the dollar figure?
Dr. PORTERFIELD. $189,000.
Mr. THOMAS. How long a course will it be?
Dr. PORTERFIELD. This varies with the different medical schools and how they do it in their curriculums.
Mr. THOMAS. How many students will take the course? How do you arrive at your $189,000?

MEDICAL EDUCATION FOR NATIONAL DEFENSE

Dr. PORTERFIELD. The $189,000 from HEW is one-quarter of the total cost of this program, the rest being provided by the Department of Defense. This is what is called the medical education for national defense program.
Mr. THOMAS. How many students will be involved?
Dr. PORTERFIELD. All the medical students in the senior year, and practically all the schools in the United States.
Mr. THOMAS. Your $189,000 is only one-fourth of your total cost. One-fourth is supplied out of this budget and the other three-fourths out of the defense budget?
Dr. PORTERFIELD. Yes.
Mr. THOMAS. In round figures, about $800,000 is involved. How many jobs do you have assigned to that particular function in this 1963 budget?
Dr. PORTERFIELD. No jobs are assigned.
Mr. THOMAS. Can you give an approximate opinion of how many students will share the program?
Dr. PORTERFIELD. At least 9,000.
Mr. THOMAS. Is there any certainty these senior students will have time to carry this additional course in addition to their regular courses?
Dr. PORTERFIELD. This, of course, has been one of the problems. This did not arise overnight in all the medical schools of the United States. We worked over a fair number of years with the deans of the medical schools to get this concept integrated into their curriculum planning.
As I have said, essentially all the medical schools now have this incorporated. Many of them do it to save the students hours by the integration——
Mr. THOMAS. What do you figure the cost is per student for this course? Nine thousand against $800,000. How much is that?
Dr. PORTERFIELD. $88, roughly.
Mr. THOMAS. How many medical colleges are involved?
Dr. PORTERFIELD. Eighty-six.

EMERGENCY HEALTH SERVICE JUSTIFICATION

Mr. THOMAS. We will turn to page 32 and put that in the record along with page 32.

(The pages referred to follow:)

JUSTIFICATION OF ESTIMATE

a. Emergency health services.—The estimate is distributed by function as follows:

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Amount	Positions	Amount	Positions	Amount
1. Medical stockpile:						
(a) Acquisition of stocks	.....	$31,315,000	.....	$31,250,000	.....	−$65,000
(b) Inventory management	23	3,988,000	23	8,020,000	.....	+4,032,000
(c) Planning and administration	63	561,000	68	730,000	+5	+169,000
Subtotal, medical stockpile	86	35,864,000	91	40,000,000	+5	+4,136,000
2. Emergency health training and community preparedness	69	901,000	104	1,445,000	+35	+544,000
Total, emergency health services	155	36,765,000	195	41,445,000	+40	+4,680,000

Subactivity 1. Medical stockpile

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Amount	Positions	Amount	Positions	Amount
Personnel compensation and benefits:						
Inventory management	23	$190,000	23	$194,000	.....	+$4,000
Planning and administration	63	494,000	68	565,000	+5	+71,000
Total, personnel compensation and benefits	86	684,000	91	759,000	+5	+75,000
Travel and transportation of persons	.....	24,000	.....	48,000	.....	+24,000
Transportation of things	.....	502,000	.....	1,926,000	.....	+1,424,000
Rent, communications, and utilities	.....	20,000	.....	26,000	.....	+6,000
Printing and reproduction	.....	5,000	.....	17,000	.....	+12,000
Other services	.....	17,000	.....	41,000	.....	+24,000
Services of other agencies	.....	3,277,000	.....	5,896,000	.....	+2,619,000
Supplies and materials	.....	17,238,000	.....	13,796,000	.....	−3,442,000
Equipment	.....	14,097,000	.....	17,491,000	.....	+3,394,000
Total, medical stockpile	86	35,864,000	91	40,000,000	+5	+4,136,000

The goal of the medical stockpile program is to insure to the greatest possible extent the availability of adequate medical supplies and equipment for civilian needs in time of disaster, both man made and natural. In order to achieve this objective, the materials stockpiled must be so placed as to make them immediately available to manpower which has been trained to use them, must be functionally packaged to permit efficient maintenance while in storage and effective utilization in an emergency, and must be prepositioned as near as possible to the site of expected use.

On the basis of damage assessment data made available by the National Resources Evaluation Center and professional studies, it is presently estimated that the postattack availability of health manpower would permit the effective

operation of a total of about 9,500 civil defense emergency hospitals. These hospitals would be required in addition to the remaining nondamaged permanent hospitals. The 1962 program brings the civil defense emergency hospital total up to 2,682 or about 28 percent of the projected goal. The essential medical survival items expected to be available postattack from all normal distribution channels plus those contained in the medical stockpile provide approximately 30 percent of the medical survival items required for basic medical care of the surviving population during the first 6 months postattack. The present high priority on the attainment of full civil defense capability necessitates rapid expansion in the medical stockpile program.

In the maintenance of the medical stockpile program, four basic requirements are involved: (1) selecting storage facilities that provide the maximum possible protection from the attack damage, (2) applying storage methods that minimize loss from deterioration, (3) adopting quality control procedures that assures usability of stockpile content at any time, and (4) keeping adequate numbers of individuals in the community informed as to location, content, and use of medical stockpile inventory.

The funds requested in this activity are for procurement, storage (including underground storage), distribution, stock surveillance and maintenance of emergency civil defense medical supplies and equipment in 1963 and for the salaries and expenses necessary for planning and administration of the medical stockpile program. Provision will be made for (1) the continuity of planning and direction of medical stockpile programs and activities, (2) an effective medical stockpiling support to health mobilization planning, (3) the acquisition of the new materials which will be required for the assembly and prepositioning of 750 additional civil defense emergency hospitals, (4) replacement of absolete and deteriorated shelf-dated materials, (5) the continuation of an accelerated prepositioning of emergency medical supplies and equipment to States and local communities and (6) the continuation of improved levels of stock surveillance, maintenance, rehabilitation, and preservation of materials stored in civil defense medical depots and in the custody of the States or local communities.

EMERGENCY HOSPITALS

Mr. THOMAS. We are getting into medical supply acquisition, maintenance, transportation, warehousing, and so forth.

You are seeking an increase this year over last year of how much in the way of acquisition of stocks?

How many additional hospitals do you plan to buy?

Dr. PORTERFIELD. 750 additional hospitals.

Mr. THOMAS. Each hospital has 200 beds. How many hospitals do you have on hand now, and where are they located?

Dr. PORTERFIELD. We have 2,682 hospitals, or will have by the end of this fiscal year.

Mr. THOMAS. At the end of fiscal year 1962, how many will you have?

Dr. PORTERFIELD. 2,682 hospitals.

Mr. THOMAS. Each hospital has 200 beds fully equipped with generators, medical supplies, surgical instruments, paper sheets, towels, and so forth.

How many will this $4,686,000 buy?

Dr. WAGNER. The funds requested for medical stockpile for fiscal year 1963 would bring the total to 3,432.

PROCUREMENT OF EMERGENCY HOSPITALS

Mr. THOMAS. Do you have any information on the price you are paying this year as compared to last year?

Dr. PORTERFIELD. The price of a hospital with a 3- or 4-day capability——

Mr. THOMAS. Wait a minute.

When you buy them, what is the capability?

Dr. PORTERFIELD. In the past, the 1,932 were with a 3- to 4-day supply capability.

Mr. THOMAS. You have them up to 30 days?

Dr. PORTERFIELD. Yes, which increased the dollar value from $25,000 to $45,000.

Mr. THOMAS. Per hospital?

Dr. PORTERFIELD. Yes.

Mr. THOMAS. What does each hospital cost with a 30-day capability?

Dr. PORTERFIELD. $45,000.

Mr. THOMAS. Is the price going up or down?

Dr. PORTERFIELD. The price and value is generally going up, sir.

Mr. THOMAS. Where is your source of supply?

We have bought so many of these hospitals it looks like the unit cost ought to be coming down.

Dr. PORTERFIELD. The average cost of the 1,932 hospitals will run around $22,000. That varies from a low of $19,000 up to $27,000.

Mr. THOMAS. Who is procuring these for you?

Dr. PORTERFIELD. The Defense Medical Supply Agency, sir. They procure the materials and the hospitals are assembled by the Veterans' Administration.

LOCATION OF EMERGENCY HOSPITALS

Mr. THOMAS. The same crowd that has been procuring them all along. They are sent over to New Jersey and there they are assembled. Where are they stored when you get them packaged?

Dr. PORTERFIELD. They are prepositioned in the States, sir. We send them out around the States.

Mr. THOMAS. Where have you sent them?

Dr. PORTERFIELD. We have a map here which shows the distribution by States, sir, of the 1,908 which are presently out in preselected sites.

Mr. THOMAS. Give us a table by States rather than a map. We would like some information on where they are located. Heretofore we have insisted on your predecessor agencies getting these supplies out of big warehouses and into the country where they could be used if needed. Certainly distribution is a very, very important factor.

(The information supplied follows:)

Civil defense emergency hospital listing, by States, Feb. 1, 1962

	Total		Total
Alabama	40	New Jersey	84
Alaska	2	New Mexico	12
Arizona	11	New York	62
Arkansas	17	North Carolina	35
California	157	North Dakota	13
Colorado	36	Ohio	119
Connecticut	32	Oklahoma	20
Delaware	1	Oregon	36
Florida	38	Pennsylvania	169
Georgia	27	Rhode Island	14
Hawaii	12	South Carolina	25
Idaho	11	South Dakota	12
Illinois	61	Tennessee	38
Indiana	29	Texas	91
Iowa	21	Utah	20
Kansas	15	Vermont	15
Kentucky	28	Virginia	35
Louisiana	31	Washington	36
Maine	18	West Virginia	11
Maryland	34	Wisconsin	57
Massachusetts	53	Wyoming	11
Michigan	79		
Minnesota	62	State totals	1,893
Mississippi	35	District of Columbia	1
Missouri	71	Puerto Rico	12
Montana	11	Virgin Islands	2
Nebraska	18		
Nevada	21	Grand total	[1] 1,908
New Hampshire	7		

[1] 14 presently in depots for rehabilitation; 8 retained in depot stock; 1 disassembled and returned to stockpile by line item; 1 retained by OCD, DOD, Battle Creek.

Mr. THOMAS. We have had information that you have put on some demonstrations at some of these hospitals and some people have inspected them and they are in very, very bad condition. Have you had occasion to check into your stockpile in the various localities?

Dr. PORTERFIELD. Yes, sir; we have.

Mr. THOMAS. How many localities are these 2,000 hospitals located in?

Dr. PORTERFIELD. 2,000.

LOCATION OF HOSPITALS IN TENNESSEE

Mr. THOMAS. That is a round figure. Where are they located? Give us some idea. Take Tennessee. There is a good, well-located State.

Dr. PORTERFIELD. The total in the State is 37. They are located in such places as Blountville.

Mr. THOMAS. How many in Blountville?

Dr. PORTERFIELD. One.

Mr. THOMAS. Who has custody and care?

Dr. PORTERFIELD. It is in the Sullivan County Health Center.

Bolivar, one hospital in the Central High School.

Mr. THOMAS. In the Central High School?

Dr. PORTERFIELD. That is the name of it, Bolivar Central High School.

Mr. THOMAS. Who is maintaining it in the high school?

Dr. WAGNER. The State has a designated custodian, and he works for the State and has responsibility for the custody of the hospital package.

Mr. THOMAS. When was the last time it was inspected? Do you know the readiness of it?

Suppose we were to get into trouble in that section of the country. How long would it take you to get that hospital into action?

Dr. PORTERFIELD. We assume that it will take a matter of hours.

Mr. THOMAS. That is where the trouble comes. Let's not assume anything. What do we know?

Dr. PORTERFIELD. I had to assume in this instance until I look up the table. We have a table also that shows the present status of each of these hospitals according to the last inspection.

Mr. THOMAS. When was the last inspection? That is what we want to know. Go ahead and finish Tennessee now. Where are the rest of them?

Dr. PORTERFIELD. Brownsville in the Haywood County high school gymnasium.

Brunswick, in the Shelby County Brunswick High School.

Calhoun, in the Calhoun Elementary School.

Mr. THOMAS. How many hospitals?

Dr. PORTERFIELD. One in each of these, sir.

Camden, in the Camden Junior High School.

Clarksville, in the Memorial Hospital.

Cleveland, in Hardwick Mills.

Columbia, in the Old City and Fire Hall Building.

Cookeville, in Building No. 4 at East Broad and Oak Streets.

Copperhill 59, the Copper Basin Hospital.

Dresden, in the National Guard Vehicle Storage Building.

Mr. THOMAS. Where is that?

Mr. EVINS. In the northwestern section of Tennessee.

Dr. PORTERFIELD. Fayetteville in the Holman Building.

Forrest Hills, in the Shelby County Forrest Hills School.

INSPECTION OF EMERGENCY HOSPITALS

Mr. THOMAS. Does anyone in the room have any reasonable first-hand accurate information as to the condition of these hospitals?

Dr. WAGNER. Yes, as of September 30, 1961.

Mr. THOMAS. When did you take the hospitals over by virtue of the Executive order? Not a paper takeover, but when did you physically take over?

Dr. WAGNER. August of 1961, by Executive order. October 1960, by interagency agreement.

Mr. THOMAS. You have had them about 8 months. What have you done by way of inspecting them to see what condition they are in since you have taken them over 8 months ago?

Dr. WAGNER. Mr. Chairman, we have set up a mechanism for the inspection and are now catching up with the backlog. The mechanism we have set up is by contract with GSA. They have established teams of three people, 22 of these teams, that are going out in the States and examining the storage site the hospital is located in, the contents

of the hospital, and are on the spot doing the corrections which they are capable of doing on the spot.

Mr. THOMAS. Why do you delegate that to GSA? They are not medical people.

Dr. WAGNER. It is under contract with them.

Mr. THOMAS. Why?

Dr. WAGNER. Because they have the mechanism.

Mr. THOMAS. All they do is a job that perhaps any layman can do. Did the VA package for you?

Dr. WAGNER. The VA did the packaging.

Mr. THOMAS. Why transfer your responsibility of seeing this is properly stored by GSA?

Dr. PORTERFIELD. It was felt they had a better base from which to do this. We set the standard. We have an inspection and maintenance manual as to the condition they should be in, inspection forms, standards to check, corrective measures to be taken, and if they follow this precisely we will know what condition the hosiptals are in.

Mr. JONAS. But you have to set up a coordinator now to examine the 22 teams to be sure the participants are qualified to examine these hospitals. Then you have to review their work. That just adds another degree of shuffling papers back and forth between agencies.

The chairman wants to know, Why you did not do this yourself and keep it within your own jurisdiction?

Dr. WAGNER. The problems are primarily within the scope of the capability of the GSA and have to do with the location of stocks, how they are stockpiled, how they are maintained, and how they are held and packaged.

Mr. JONAS. How do you know these three-man teams are qualified?

Dr. WAGNER. They are trained.

Mr. JONAS. By whom?

Dr. WAGNER. We assist the GSA.

Mr. JONAS. That is just what I thought.

Dr. WAGNER. In the training of the people, and at the same time——

Mr. JONAS. You are doing part of the training and GSA is doing part of the training. That means both of you have to have a training staff, and keep records in both agencies. It is an overlapping function.

USE OF SUPPLIES FROM EMERGENCY HOSPITALS

Mr. THOMAS. What is troubling me is: If the country gets in trouble will these hospitals be available? Mr. Evins seems to have an idea perhaps this material in the warehouse is a source of materials for a lot of hospitals right now.

I am afraid when we go to get it, it will not be there. It already will be in use some place else. Do you have any information on that, Doctor?

Dr. WAGNER. Yes.

Mr. THOMAS. That is one of the criticisms. What did the Comptroller General's Office say about this storage of this material? Are you familiar with the Comptroller General's report on this?

Dr. PORTERFIELD. I am not.

Mr. THOMAS. Is anyone?

Mr. EVINS. There is a practice of local hospitals, if they need certain supplies, to draw on the reserve with their check put in to refurnish it. Is there not a drawing on the supplies of these hospitals?

Dr. WAGNER. No, not by local hospitals in their regular operation.

Dr. PORTERFIELD. There have been in some of the open stockpiles an attempt to develop by the States some rotation schemes to use the aging material, and to get it replenished with new material.

This works well in some States and is not as useful in others. This does not have to do with this prepackaged material in the hospital units.

Mr. THOMAS. Are you sure about that, Doctor?

Dr. PORTERFIELD. Reasonably sure. I am sure as you can be from one place.

CUSTODY OF HOSPITALS

Mr. JONAS. You say you have custodians designated at each of the hospitals?

Dr. PORTERFIELD. Yes.

Mr. JONAS. Is that a full-time person?

Dr. WAGNER. In most instances, they are either full time, or they have other duties and occupations.

Mr. JONAS. I want to know, is he a full-time custodian, or do you just pay the janitor, or the custodian of the school, or the hospital, a little extra money?

Dr. WAGNER. The custodian is a volunteer and has a custodial responsibility for the hospital. He has other duties or jobs and if he is paid for being custodian of the hospital, the State pays him.

Mr. JONAS. Someone pays him?

Dr. WAGNER. Yes, if he is paid for taking care of the hospitals. Many provide their service without pay.

Mr. JONAS. I want to know whether he has any duties other than being in charge?

Dr. WAGNER. In most instances, he does, sir.

Mr. JONAS. What is the size of this hospital, the dimensions?

Dr. WAGNER. The old hospital, the 1930, now prepositioned, occupies about 1,600 cubic feet. The new hospital will occupy approximately 6,000 cubic feet.

Mr. JONAS. Are they kept under lock and key?

Dr. WAGNER. Yes.

Mr. JONAS. And this custodian is financially responsible for safety or damage?

Dr. WAGNER. The State is financially responsible. The custodian is an agent of the State.

USE OF HOSPITALS

Mr. JONAS. How many hospitals have been used?

Dr. WAGNER. In natural disasters?

Mr. JONAS. Yes.

Dr. WAGNER. I would qualify it by saying part, maybe 50 hospitals, have been used. I would have to verify this, sir, for an exact answer.

No hospital, to my knowledge, has been used as a complete hospital for a mass casualty condition because in the disasters we have had, communities have been able to handle their medical casualties within regular existing hospitals.

TOTAL HOSPITAL OBJECTIVE

Mr. JONAS. What is your ultimate goal? How many hospitals do you envision?

Dr. WAGNER. We want 9,500 ultimately.

Mr. JONAS. I mean permanently. What is the total projected figure?

Mr. PORTERFIELD. That would be our total.

Mr. JONAS. That is all.

HANDLING OF MEDICAL SUPPLIES

Mr. THOMAS. Will you put pages 12 and 13 of the committee staff investigation report in the record at this point, dealing with medical supplies, particularly in hospitals?

(The information referred to follows:)

I. STAFF RECOMMENDATIONS—PREPOSITIONED HOSPITALS

The stated purpose of prepositioned hospitals is for safe permanent storage

The stated purpose of prepositioned hospitals is for safe permanent storage of hospitals in unopened original containers at or near the places of eventual use where they can be put into operation immediately in case of an emergency. When a State indicates its interest in participating in the program it enters into a formal agreement with respective regional directors of OCDM. Certain obligations and responsibilities are accepted by the State regarding the storage, maintenance and security of the hospitals.

It is the opinion of the staff, based upon the observations set forth heretofore, that the respective States are not fulfilling the obligations and responsibilities which they accept when entering into the storage agreement.

In many instances, it appeared that storage sites had been selected by the States without regard for adequate storage space and security. In numerous instances it was determined that State officials had not inspected the proposed storage site prior or subsequent to the hospital being stored. In one instance the custodian advised he had no knowledge that the hospital was to be stored until it arrived at location. It is believed that the failure to properly select and prepare storage sites is one of the primary weaknesses in the prepositioning program.

Another significant factor appeared to be the lack of knowledge and/or interest of custodians as to their responsibilities for storage and maintenance. In some instances site custodians advised they had been instructed by local or State civil defense officials not to take any action regarding the hospital as it would be done by the State officials; however, no assistance or instruction was forthcoming. In one instance a custodian advised he was aware that the hospital was not stored or maintained properly and although he had planned to take corrective action when time permitted he had not found time to do so.

INSPECTION AND COMPLIANCE PROGRAM FOR HOSPITALS

Pre-positioned hospitals are the property of the Federal Government and their accountability is the responsibility of OCDM. It will be noted that at 62 percent of the storage sites visited, the hospitals were not stored properly. Therefore, it is felt that OCDM should consider the establishment of a complete inspection and compliance program for all pre-positioned hospitals. It is suggested that this program should encompass at least the following:

(1) Inspection and approval by OCDM personnel of each storage site to insure it meets OCDM criteria;

(2) Relocation or removal of hospitals where sites are not satisfactory;

(3) Proper storage of all components to permit inspections and inventories and to eliminate deterioration;

(4) Physical inventory to determine shortages and necessary corrective action;

(5) Determine and record the actual location of items requiring special storage including generators which are often stored separately from other components;

(6) Complete and thorough briefing of all responsible State and local custodians to insure that they are aware of their responsibilities as set forth in the storage agreement;

(7) Obtaining a written statement indicating the State is waiving the flammable storage requirement if flammable items are not segregated;

(8) Establishment of an appropriate administrative procedure to insure that each State complies with requirements in storage agreements including the submission of annual certificates of inspection and report of condition;

(9) Establish an administrative control whereby recommendations made as a result of inspection, by State or OCDM personnel, will be acted upon.

Mr. THOMAS. May I read into the record at this point a part of page 13:

Pre-positioned hospitals are the property of the Federal Government and their accountability is the responsibility of OCDM.

This was before the transfer of last August.

It will be noted that at 62 percent of the storage sites visited, the hospitals were not stored properly; in some instances security measures were inadequate and certain components were not maintained properly. Therefore, it is felt that OCDM should consider the establishment of a complete inspection and compliance program for all pre-positioned hospitals. It is suggested that this program should encompass at least the following:

We will set them out. I will submit this to you. You may want to read it.

FOOD AND DRUG ACTIVITIES

Mr. Reporter, at this point, will you put "Food and drug activities," page 49, in the record?

(The pages referred to follow:)

Food and drug activities

	1962 estimate		1963 estimate		Change	
	Positions	Amount	Positions	Amount	Positions	Amount
Training program	9	$80,000	9	$95,000	----	+$15,000
Biological warfare research program	2	25,000	2	25,000	----	----
Total	11	105,000	11	120,000	----	+15,000

The civil defense functions of the Food and Drug Administration are performed organizationally by the Bureau of Biological and Physical Sciences and the Bureau of Program Planning and Appraisal.

Under delegated authority FDA carries out two programs designed to protect the purity and safety of the Nation's foods, drugs, and cosmetics from the effects of radiological, biological, and chemical warfare agents. These programs are a

training program and a biological warfare research program. These programs are described more fully in the material which follows:

Training program

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Net cost	Positions	Net cost	Positions	Net cost
Personnel compensation and benefits	9	$63,300	9	$78,300		+$15,000
Travel and transportation of persons		14,100		14,100		
Rent, communications, and utilities		600		600		
Printing and reproduction		1,300		1,300		
Other services		200		200		
Supplies and materials		500		500		
Total, training program		80,000		95,000		+15,000

This program is designed to acquaint Federal, State, and local food and drug officials and members of industry with information about the problems that will confront them involving contamination of our food and drug supplies from enemy use of radiological, biological, and chemical warfare agents and the action which they should take in the event of such an emergency to assure safe food and drugs.

FOOD AND DRUG EMPLOYMENT

Mr. THOMAS. This shows an increase of $15,000 against last year, bringing the total to $120,000.

The civil defense functions of the Food and Drug Administration are performed organizationally by the Bureau of Biological and Physical Sciences and the Bureau of Program Planning and Appraisal.

How many jobs do you have in this unit, please?

Mr. GREY. Eleven, sir.

Mr. THOMAS. How many did you have last year, and how many have you had since 1955 by year?

Mr. GREY. We had 11 last year, sir, and 11 next year. There is no increase in personnel. I do not recall what it was for the years prior to that, but it was a lesser number.

Mr. THOMAS. Will you insert those numbers in the record at this point?

(The information supplied follows:)

1955	13	1959	2
1956	18	1960	11
1957	23	1961	11
1958	None	1962	11

Mr. THOMAS. Would you say it was as many as eight or nine full-time jobs?

Mr. GREY. Approximately.

EMERGENCY WELFARE SERVICES

Mr. THOMAS. Mr. Reporter, will you put pages 52, 53, and 54 in the record at this point, "Emergency welfare services."

(The pages referred to follow:)

Emergency welfare services

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Net cost	Positions	Net cost	Positions	Net cost
Personnel compensation and benefits	25	$245,000	29	$277,000	+4	+$32,000
Travel and transportation of persons	.....	22,000	.....	24,100	.....	+2,100
Transportation of things	.....	1,000	.....	2,500	.....	+1,500
Rent, communications, and utilities	.....	500	.....	700	.....	+200
rinting and reproduction	.....	5,000	.....	17,000	.....	+12,000
Other services	.....	6,000	.....	6,000	.....	.....
Services of other agencies	.....	5,000	.....	6,000	.....	+1,000
Supplies and materials	.....	2,500	.....	2,700	.....	+200
Equipment	.....	3,000	.....	2,000	.....	−1,000
Total	.....	290,000	.....	338,000	.....	+48,000

The increase of $48,000 requested under this activity provides for four additional regional positions. The 1962 budget includes 13 central office and 12 regional civil defense positions—the latter provides for 1 professional and 1 clerical position in each of 6 of the 9 regional offices. The professional position is an emergency welfare service representative and has broad responsibility for continuing contacts with State public welfare officials carrying responsibility for civil defense emergency welfare services This regional staff provides guidance and technical assistance on emergency welfare service to State and local public welfare departments in accordance with established Federal-State relationships.

For 1963, an increase of four new positions is requested to permit assignment of one professional position to each of the other three regional offices and a clerical position to one of these three regions.

GENERAL STATEMENT

In accordance with the concept of building civil defense capabilities into existing Government agencies with related peacetime programs, the Department of Health, Education, and Welfare has been assigned responsibility for developing the full range of civil defense emergency welfare. This responsibility, assigned to the Commissioner of Social Security, was delegated to the Bureau of Public Assistance with provision made for working with the Children's Bureau. These bureaus in the Social Security Administration operate in accordance with established peacetime channels of communication and direction. The program is being developed in consonance with activities of the Office of Civil Defense, Department of Defense.

The regional structure and existing channels of Federal-State-local counterpart relationships in the welfare field are utilized in order to assign civil defense functions to existing Government agencies with similar peacetime functions that require the same kinds of skills as the civil defense functions. The large number of persons required to man this job obviously precludes the establishment of a separate organization with no function other than that of being prepared and standing by to go into action at the time of attack or threatened attack . Therefore, assignments to public welfare agencies have been made on the basis that the civil defense programs should be developed as an integral part of the regular activities of the Government agencies; and that these agencies will have the responsibility for carrying out the emergency programs in the event of enemy attack. State public welfare departments which are responsible for the State emergency welfare programs will operate through the same channels as now, and in close coordination with other civil defense programs through the State civil defense agency. Emergency welfare functions are assigned to State public welfare departments or public assistance agencies in all States. The assignments are made by the Governor, by the State civil defense director, or by State law.

The goal is to develop an integrated national program of essential welfare aid and services to assure availability of the necessities of life to the homeless and others in need of help in the event of enemy attack or the threat of enemy

attack. The program of emergency welfare service, as contemplated under this assignment, involves a full range of welfare services in relation to both shelter and postshelter readiness in the following areas: lodging; feeding; clothing; registration and inquiry; help in locating and reuniting individuals and families; care of groups needing special services such as children separated from their families, the aged, and handicapped; financial assistance; and all other feasible emergency welfare aid and services.

The scope, character, and dimensions of these emergency activities go beyond the Department's normal welfare responsibilities which consist primarily of assisting States to furnish a different and more limited kind of aid to specified needy groups—a relatively small segment of the population compared to the number that would need aid in a wartime emergency.

The basic activities being carried to accomplish the goal of Emergency Welfare service are: (1) preparation of national guidance materials for use by States and localities in developing a readiness to provide the emergency welfare services set forth above, and for use of welfare institutions, such as homes for the aged and handicapped in planning disaster preparedness measures; (2) development of training programs and materials including assistance to States in building emergency welfare training into their regular program staff development activities, and the conduct of training courses; and (3) technical assistance to States and localities in the many phases of planning necessary to achieve preparedness for emergency welfare services, including services for community shelter occupants.

PROGRAM DIRECTION AND COORDINATION

Emphasis will continue on development of supportive relationships for the program of Emergency Welfare Service with other Federal departments and agencies and with national voluntary welfare and related agencies to assure the best possible corrdination of the assigned welfare function with overall civil defense planning. There will be collaboration with the new office of Civil Defense in the Department of Defense and with the Office of Emergency Planning on the many planning aspects of the program and on the development of Federal support procedures for assistance to States in a civil defense emergency. Close working relationships must be maintained within the Department of Health, Education, and Welfare—with the Office of Education, Public Health Service, Food and Drug Administration, and Office of Vocational Rehabilitation. Examples of joint planning with other departments and agencies include work with the Post Office Department on emergency welfare registration and inquiry; with the Housing and Home Finance Agency on emergency welfare lodging; with the Department of Agriculture on food resources; with the Department of the Interior on fuel and power; with the Departmentof Commerce on consumer survival commodities; and with the Department of Labor on manpower resources.

An essential part of the Emergency Welfare Service programing is interpretation of the program to national voluntary welfare agencies; their participation will be obtained as needed. There must be cooperation with and assistance to these agenices in stimulating support and interest of their local affiliates in this program.

Memorandums of understanding were completed in fiscal year 1961 for 11 national voluntary welfare agencies regarding their roles in support of the Federal Government in preattack planning and postattack operations. Negotiations will continue with other selected agencies to obtain similar agreements in 1962 and 1963.

PROGRAM DEVELOPMENT AND OPERATIONS

Current plans provide for issuance in fiscal year 1962 of national guidance materials in final form covering the following manuals related to the shelter and postshelter period: "Emergency Welfare Service—Guidelines and Structure"; "Emergency Social Services"; "Emergency Lodging"; "Emergency Welfare Registration and Inquiry"; "Emergency Feeding"; and "Emergency Clothing." It is also planned to issue to superintendents of welfare institutions the "Handbook for Civil Defense Emergency Planning in Welfare Institutions." Following issuance of these materials, it will be possible in 1963 to move with a great deal of initiative on field activities designed to help State and local public welfare agencies develop a state of operating readiness within the broad scope of emergency welfare service essential to the welfare of this country's people

in a civil defense emergency. The national guidance materials are fundamental to obtaining this objective and will provide the basis for moving ahead in developing as quickly as possible operating capability throughout the Nation in emergency welfare service.

Federal-State and local exercises will be carried out in 1963 to test the effectiveness of these national guidance materials planned for issuance in fiscal year 1962.

Work in this area includes central office support of regional operations on emergency welfare. The need for central office advice on problems will become heavier as States organize and develop their civil defense emergency welfare programs. This will be particularly true when problems concern a number of States and involve changes in the methods and procedures outlined in the guidance documents for application throughout the country. Many such problems are foreseen because of undecided policy questions which can be resolved only after testing of the guidance materials in the States and localities. Problems still unidentified will undoubtedly be brought to light through that same testing, and solutions will have to be found.

SUMMARY OF EMERGENCY WELFARE REQUEST

Mr. THOMAS. I note you had 25 jobs in 1962. You want 29 this year, at a cost of $277,000, an increase of $32,000 over last year. You break them down into travel, $22,000, et cetera, on down the line. Your biggest item is your salary expenses.

The increase of $48,000 requested under this activity provides for four additional regional positions. The 1962 budget includes 13 central office and 12 regional civil defense positions—the latter provides for 1 professional and 1 clerical position in each of 6 of the 9 DHEW regional offices. The professional position is an Emergency Welfare Service representative and has broad responsibility for civil defense emergency welfare services. This regional staff provides guidance and technical assistance on emergency welfare service to State and local public welfare departments in accordance with established Federal-State relationships.

For 1963, an increase of four new positions is requested to permit assignment of one professional position to each of the other three regional offices and a clerical position to one of these three regions.

In accordance with the concept of building civil defense capabilities into existing Government agencies with related peacetime programs, the Department of Health, Education, and Welfare has been assigned responsibility for developing the full range of civil defense emergency welfare. This responsibility, assigned to the Commissioner of Social Security, was delegated to the Bureau of Public Assistance with provision made for working with the Children's Bureau. These bureaus in the Social Security Administration operate in accordance with established peacetime channels of communication and direction. The program is being developed in consonance with activities of the Office of Civil Defense, Department of Defense.

What are your functions, gentlemen?

The goal is to develop an integrated national program of essential welfare aid and services to assure availability of the necessities of life to the homeless and others in need of help in the event of enemy attack or the threat of enemy attack. The program of Emergency Welfare Service, as contemplated under this assignment, involves a full range of welfare services.

That is an understatement. If you put emphasis on "full" it will be all right. It involves shelter, postshelter readiness, lodging, feeding, registration and inquiry, help in locating and reuniting families, care of groups needing special services, such as children separated from their families, the aged, and the handicapped. It is a tremendous undertaking, gentlemen, is it not?

EMERGENCY WELFARE EMPLOYMENT

How many jobs do you have assigned to this function now? You want 29 for 1963 against 25 in 1962. How many did you have in 1955, 1956, 1957, and on down the line?

Mr. TRUELSON. It varied. Last year we had 25, the previous year, 25, filled for a portion of the year. It went back to 1958, there was no appropriation.

Mr. THOMAS. What is your total employment in the entire Department for the fiscal year 1962?

Mr. FISHER. Approximately 70,000, Mr. Chairman.

Mr. THOMAS. How many will it be for fiscal year 1963?

Mr. FISHER. I think it goes up to about 78,000.

ABSORPTION OF CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. Can't you absorb 29 jobs out of that 78,000 to do this work? It is a field that you plow every day, with just a little different aspect to it.

Mr. TRUELSON. These 29 positions are in the Bureau of Family Services which was formerly the Bureau of Public Assistance; we have about 370 positions out of the total that is in the Department and we find that these functions that are assigned to us under this Executive order are very different than our present responsibilities in public assistance. Emergency lodging, for example, or emergency welfare registration and inquiry, those functions are very different than making payments for old-age assistance, aid to dependent children, and other categories. We feel this is a responsibility that we need to carry and we need additional staff to do it. This is a minimum request.

Mr. THOMAS. Mr. Truelson, between you and I and our very distinguished administrator, Mr. Ribicoff, we believe you certainly can absorb 29 people out of 78,000 or 79,000. If you and the Governor will get together, you can work this thing out.

Mr. FISHER. There are something less than 400 people in this entire Bureau. We talk about absorbing 29 jobs. It should be compared to the 370 rather than to the 70,000 in the Department, sir.

Mr. THOMAS. Thank you for your observations, but we repeat, you gentlemen, in conjunction with the administrator, Mr. Ribicoff, are going to have to get together and do some assigning and reassigning. We get back to some of our regional staffing plans. You should stay by your original staffing plans and you will not have 79,000 people in your Bureau next year; you will have 85,000. We suggest that you go to your top people and do some rearranging.

FIELD PLANNING

Mr. THOMAS. Put page 57 in the record, field planning.

(The pages referred to follow:)

Field planning

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Amount	Positions	Amount	Positions	Amount
Personnel compensation and benefits	12	$113,440	12	$127,440	.....	+$14,000
Travel and transportation of persons	.....	18,520	.....	18,520	.....	.....
Rent, communications, and utilities	.....	2,340	.....	2,340	.....	.....
Printing and reproduction	.....	500	.....	500	.....	.....
Other services	.....	400	.....	400	.....	.....
Supplies and materials	.....	800	.....	800	.....	.....
Total	.....	136,000	.....	150,000	.....	+14,000

The Office of Field Administration is responsible for the direction, supervision, and coordinating of the field activities of the Department and for operation of the integrated regional office system. In the civil defense and mobilization area, the Department assumes major responsibility for the planning, preparing, and when necessary, active participation in execution of civil defense measures, relating to survival, designed to protect people and assist in speeding recovery in event of attack. While these measures are many and varied and can be delegated within the Department, they require single overall direction and coordination at headquarters and in the field. By direction of the Secretary, the regional directors have overall responsibility for all civil defense activities within the regions.

DEPARTMENTAL

The Office of Field Administration provides guidance and direction in the development of regional emergency plans and readiness; prepares and releases necessary instructions to the field; coordinates regional emergency plans with operating agencies at headquarters, and works with the HEW defense coordinator, operating agencies, Office of Civil Defense in Department of Defense, OEP, and other Federal agencies to obtain consistency in field planning and operations.

The OFA headquarters civil defense staff consists of a civil defense officer and a secretary.

FIELD

As representatives of the Secretary, the regional directors carry primary and major responsibility for developing plans and increasing readiness for continuing essential functions and carrying out assigned civil defense responsibilities in an emergency.

In carrying out these functions, it is necessary that each regional office develop and maintain consolidated operating plans for implementing HEW emergency assignments. This requires coordination of planning within the regional office in the various program areas of health and welfare and also requires coordination with regional DOD/OCD, OEP, and other Federal agency planning. The regional staff, working with OCD staff, provides assistance in developing regional, State, and metropolitan area survival plans.

The regional offices are responsible for planning, scheduling, and conducting staff training programs and test exercises in civil defense emergency operations; for developing and maintaining capability in damage assessment, and for maintaining essential data to prepare reports as required.

The OFA civil defense staff in the regional offices consists of nine staff assistants for civil defense (and one clerk) to aid the regional directors in performing their civil defense responsibilities. They have made it possible for the regional director to provide overall direction of civil defense functions within the regions and work with operating agencies in their negotiations with the State civil defense officers and individual State agencies, as well as

provide liaison for contacts with other Federal agencies having related health and welfare responsibilities such as Agriculture and the Veterans' Administration.

They are the point of regional contact for all intergovernmental negotiations on major civil defense emergency planning. This type of activity cannot be performed adequately by staff at the bureau level.

NEED FOR INCREASES

To allow for full annual salaries of certain positions currently filled by retired annuitants, $14,000.

Two of the regional coordinators are retired annuitants paid at a reduced salary rate due to their receiving annuities. The 1962 civil defense operating budget takes this reduced cost into consideration. It is now anticipated that these men will resign and be replaced with regular salaried employees. This will create an additional need of $14,000 to finance the personnel costs on an annual basis for this activity.

Mr. THOMAS. You have an increase of $14,000 against $136,000 in 1962. It brings you up to $150,000.

Printing and reproduction, rents, and utilities are included here. Travel is your largest item, and outside of your personal benefits you have 12 employees this year.

The Office of Field Administration is responsible for the direction, supervision, and coordination of the field activities of the Department and for operation of the integrated regional office system. In the civil defense and mobilization area, the Department assumes major responsibility for the planning, preparing, and when necessary, active participation in execution of civil defense measures, relating to survival, designed to protect people and assist in speeding recovery in event of attack. While these measures are many and varied and can be delegated within the Department, they require single overall direction and coordination at headquarters and in the field. By direction of the Secretary, the regional directors have overall responsibility for all civil defense activities within the regions.

You folks do a good job. You have a tremendous organization. Who has that this year?

Dr. PORTERFIELD. Mr. Lund.

FIELD PLANNING EMPLOYMENT

Mr. THOMAS. How many people have you had in prior years doing this work?

Mr. HAMBLETON. We had two people in 1957, the first year we had any staff for this operation. In 1958 we dropped to nothing. Then we started again in 1959 with 2 and in 1960 with 10. We have had 12, since 1961.

Mr. THOMAS. Mr. Reporter, put pages 59 and 60 in the record. (The justification pages follow:)

Executive direction and coordination

	1962 estimate		1963 estimate		Increase (+) or decrease (−)	
	Positions	Amount	Positions	Amount	Positions	Amount
Personnel compensation and benefits	6	$43,000	6	$45,000	----	+$2,000
Travel and transportation of persons	----	2,500	----	2,500	----	----
Transportation of things	----	100	----	100	----	----
Rent, communications, and utilities	----	1,500	----	1,500	----	----
Printing and reproduction	----	2,000	----	2,000	----	----
Other services	----	500	----	500	----	----
Supplies and materials	----	900	----	900	----	----
Equipment	----	500	----	500	----	----
Total	6	51,000	6	53,000	----	+2,000

The function is carried out by three offices: The Office of Defense Coordinator with four positions, the Office of Internal Security with one position, and the Division of General Services with one position.

	1962 estimate		1963 estimate		Increase	
	Positions	Amount	Positions	Amount	Positions	Amount
(1) Office of Defense Coordinator	4	29,320	4	31,320	----	+2,000

As in previous years, funds are included for the Office of the Defense Coordinator to provide supplemental staff for the workload of civil defense assignments made to the Department. No increase in this staff is requested. The requested addition of $2,000 provides for annualization of one secretarial position which was filed for only part of the year 1962.

Personnel for this purpose consists of one defense planning officer and three clerical-secretarial positions to assist in the coordination and followup of civil defense activities assigned to and carried out by DHEW, its operating agencies, and its regional offices; liaison and joint planning with the Department of Defense, Office of Civil Defense, and with other Federal agencies on civil defense activities as may be required; preparation of reports, staff papers, correspondence, etc., including the development and maintenance of the DHEW readiness manual for emergency planning and operations related to emergency health and welfare activities in the civil defense survival period.

These staff activities are carried as an additional part of the work of the Defense Coordinator who is a senior staff member in the Office of the Secretary.

	1962 estimate		1963 estimate		Increase	
	Positions	Amount	Positions	Amount	Positions	Amount
(2) Office of Internal Security	1	$10,560	1	$10,560	----	----

Civil defense activities under emergency preparedness orders and Executive orders have added to the workload of the Office of Internal Security in all categories—personnel security, physical security, and document security. In personnel security, it will be necessary to process personnel for sensitive positions, and to process other individuals for limited clearances (Confidential) to permit their participation in classified phases of civil defense activities. The nature of the civil defense program requires this Office to maintain continuing liaison with other offices within the Department, as well as other agencies of the Government. The various phases of civil defense and mobilization activities of the Department must be kept under cognizance for intelligence and security reasons. To handle these responsibilities a security specialist, GS–12, available in 1962 is continued into 1963.

	1962 estimate		1963 estimate		Increase	
	Positions	Amount	Positions	Amount	Positions	Amount
(3) Division of General Services	1	$11,120	1	$11,120		

This activity is responsible for replanning and maintenance in readiness, direction, and coordination of general services activities necessary at relocation sites of the Department to be activated in an emergency to carry out the assigned civil defense responsibilities as the health and welfare aim of the civil defense organization.

A civil defense officer is included in this budget to carry out the following continuing responsibilities:

(*a*) Maintain close working relationships with operating agencies of the Department in organizing and selecting a cadre of qualified personnel for assignment to relocation sites in the event of an emergency to provide the necessary communication, mail, messenger, reproduction, procurement, supply property, transportation, food and housing services. Develops criteria for manpower requirements for each general services area, progressively, from a D-minus situation through D+30; periodically updates roster of personnel carrying specific assignments.

(*b*) Participate with DOD and other agencies as appropriate in formulating plans and establishing criteria for stockpiling, storage, care, and handling of survival food in terms of number of people to be served.

(*c*) Establish emergency equipment and supply standards consistent with the number of personnel involved and space available.

(*d*) Determine the potential of private dwellings and facilities to accommodate personnel at relocation sites, and execute preliminary letters of understanding.

This Office must also cooperate with the HEW Defense Coordinator, DOD, and other Federal agencies to obtain consistency in developing emergency plans and issuing necessary instructions and procedures for administrative support and general services activities.

Mr. THOMAS. This is Executive direction and management.

You have six people. Travel is $2,500. Where are these people located? You have got three offices. Where are they located?

Mr. SNYDER. Four of these people are located in my office, three of them are clerical and one is a program officer. The purpose of this is to enable the Office of the Secretary to complete the additional work responsibilities that the civil defense contracts and Executive order delegations put upon us.

Mr. THOMAS (reading):

As in previous years, funds are included for the Office of the Defense Coordinator to provide supplemental staff for the workload of civil defense assignments made to the Department. No increase in this staff is requested. The requested addition of $2,000 provides for annualization of one secretarial position which was filled for only part of the year 1962.

What are the duties?

Mr. SNYDER. Of the four people, three are clerical, one is a program officer. One of the responsibilities of the program officer is to maintain the Emergency Manual which details the Department's operating plans that would be in effect in an emergency and for the Secretary to pull together——

Mr. THOMAS. There is alinement with the Defense Department, et cetera.

Mr. SNYDER. Yes. One of the other jobs has to do with the security program. As you can well imagine, much of our material is classified, both from the Office of Emergency Planning and from the Defense Department. This has to be maintained in accordance with security regulations. It is for this type of responsibility, for the Secretary's office, that these people are used.

FINANCING OF CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. Has your regular appropriating group voiced any opinion on this matter of these special activities dealing with radiation? Have they suggested you separate them from your regular budget?

Mr. FISHER. I do not believe that there was any comment on this item at all, sir, in the regular committee.

Mr. THOMAS. The subcommittee has not expressed an opinion?

Mr. FISHER. They have not yet reported.

Mr. HAMBLETON. Mr. Fogarty did ask that we put a table in the record showing the funds for civil defense activities that were integrated in our regular appropriations. He asked that on the last day of the hearing.

Mr. THOMPSON. May I ask, did he also this year admonish you not to use any of your regular appropriations for this purpose?

Mr. FISHER. Apparently not.

Mr. THOMPSON. He has in the past, every year.

Mr. HAMBLETON. He has in the past, but not in the last session that I just mentioned.

SUMMARY OF NEW POSITIONS REQUESTED FOR CIVIL DEFENSE FUNCTIONS

Mr. THOMAS. Mr. Reporter, will you put page 62 in the record? (The page referred to follows:)

CIVIL DEFENSE AND DEFENSE MOBILIZATION FUNCTIONS

New positions requested, fiscal year 1963

	Grade	Annual salary
Medical stockpile:		
Distribution officer (2)	GS-9	$12,896
Property officer	GS-9	6,448
Property and supply clerk	GS-5	4,347
Clerk-typist	GS-4	4,056
Total (5)		27,747
Emergency health training and community preparedness:		
Public health adviser	GS-14	12,230
Public health adviser (2)	GS-13	21,300
Public health adviser (14)	GS-11	105,994
Resource management officer (8)	GS-11	60,568
Training instructor	GS-11	7,571
Public health adviser (7)	GS-9	45,136
Training instructor	GS-7	5,366
Secretary	GS-5	4,347
Clerk-typist	GS-4	4,056
Assistant Chief, Training Branch	CO	10,080
Total (37)		276,648
Emergency welfare services:		
Associate regional representatives (3)	GS-13	31,950
Clerk-stenographer	GS-5	4,347
Total (4)		36,297
Grand total (46) [1]		340,692

[1] 2 positions are deleted in 1963 for a net increase of 44.

Mr. THOMAS. Thank you very much, gentlemen.

HOUSING AND HOME FINANCE AGENCY

WITNESSES

B. DOUGLAS STONE, DIRECTOR, DEFENSE PLANNING STAFF
CHARLES WIECKING, BUDGET ANALYST

Mr. BOLAND. We will turn to the Housing and Home Finance Agency, page 63 of the justifications.

For defense planning activities you estimate an expenditure of $250,000 in 1963. You had $160,875 in 1962. This is an increase of $89,125 for 1963.

What is your unexpended balance for your 1962 estimate? Have you spent all of that?

Mr. WIECKING. Not yet.

Mr. BOLAND. What will it be at the end of the year?

Mr. WIECKING. I do not anticipate any unexpended balance at the end of this fiscal year.

Mr. BOLAND. Put in the narrative on pages 63 and 64. Also put in page 65.

(The pages referred to follow:)

Defense planning activities

1961 actual	$160,000
1962 estimate	160,875
1963 estimate	250,000
1963/1962 difference	+89,125

SUMMARY OF BUDGET REQUEST

The budget for the fiscal year 1963 includes $250,000 for defense planning and defense mobilization functions delegated to the Housing and Home Finance Agency as part of the "Salaries and expenses" appropriation to the Administrator.

BACKGROUND STATEMENT

Emergency Preparedness Order No. 6, issued by the Director of the Office of Civil and Defense Mobilization on January 10, 1961, outlines the responsibilities of the Housing and Home Finance Agency in the areas of defense planning and defense mobilization. This order, issued pursuant to Executive Order No. 10902, charges the Housing Agency with responsibility for developing national emergency plans and preparedness programs covering all aspects of lodging or housing, related community facilities, and providing assistance in developing economic stabilization measures pertaining to real estate credit controls and rent stabilization programs.

Under general instructions for the executive branch, this budget assumes that the same general authorities of the Administrator under order No. 6 will continue during the current and budget years, under the overall policy direction and supervision of the Department of Defense and the Office of Emergency Planning.

PURPOSE OF DEFENSE PLANNING ACTIVITIES

The goal of Agency defense planning activities is the achievement of a state of readiness to carry out assigned emergency defense activities. More specifically, this involves the advance development of plans and programs for—

(*a*) The provision of emergency housing for refugees from attacked or threatened areas;

(*b*) The provision of community facilities (such as water and sewer facilities) for such emergency housing; and

(*c*) The development of a field organization competent to carry out these programs in an emergency.

BUDGET PROGRAM

The budget program for 1963 is planned to bring the Agency closer to the realization of these goals in terms of the preparation of plans, documents, instructions, and procedures, and in the organization and training of minimum staff.

(*a*) *Local emergency housing service units.*—In the current fiscal year, the Agency will complete an outline of the organization and functions of local emergency housing service units which are recommended for establishment as part of each local civil defense organization. During the budget year, overall plans call for distribution to State and local civil defense organizations; followed by conferences to assist these organizations in the training of personnel, in order that such units will be ready to act quickly in an emergency.

(*b*) *Emergency Federal organization.*—A detailed plan for organization of HHFA emergency State offices will be completed in 1962. During 1963, plans call for an intensive course of indoctrination of Agency employees with emergency assignments to move toward realization of efficient State operating units.

(*c*) *Participation of local public housing and redevelopment agencies.*—During the current year, plans will have been developed for utilization of over 1,400 local housing authorities and local public agencies under coordinated central direction in an emergency situation. In 1963, continuation of this general effort will require conferences at regional and local levels to accomplish minimum training and indoctrination, in order to permit emergency independent action under assumed emergency conditions.

(*d*) *Economic stabilization.*—At the direction of the central defense mobilization agency, HHFA has carried on advance planning for Federal and local rent stabilization for the past 3 fiscal years. In cooperation with the Office of Emergency Planning and other participating agencies, it is proposed in 1963 to prepare a detailed operating plan for a Federal rent control program and an analysis of the problems and issues involved in a transition from interim State and local rent stabilization to Federal control.

(*e*) *Emergency housing.*—The following specific projects are proposed for 1963:

(1) Preparation of instructions and guidelines for the conversion of nondwelling structures to emergency dwelling use;

(2) Preparation of drawings, specifications, lists of materials, and operating instructions for construction and use of simple trailers for temporary housing; and

(3) Clearance and distribution of other emergency housing plans not previously distributed in final form.

(*f*) *Emergency community facilities.*—During the budget year, it is proposed to complete preparation and distribution of instructions covering provision of financial assistance to localities in the repair or construction of emergency basic community facilities (principally water and sewer).

(*g*) *Claimancy and allocation.*—In cooperation with other agencies, the 1963 budget program proposes completion of plans, regulations, and procedures under which the Agency would carry out its emergency function as central claimant for materials, equipment, and manpower necessary for emergency housing and community facilities.

(*h*) *Damage assessment.*—The Agency maintains representation at the National Resources Evaluation Center.

(*i*) *Field development.*—As the plans and operating instructions referred to above are completed, emphasis on defense planning and defense mobilization activities will shift to the field level. Accordingly, tests, training, and indoctrination of regional, State, and local staffs will receive major emphasis in fiscal year 1963 by the Agency field staff.

(*j*) *Coordination and planning, central office.*—It is proposed to continue three positions in the central office to assist the Defense Planning Coordinator in the functions necessary to assure efficient conduct of defense planning and defense mobilization responsibilities.

ADMINISTRATIVE EXPENSES

The budget estimate of $250,000 (included within the appropriation requested for "Salaries and expenses") will permit employment of 25 persons at June 30, 1963, an increase of 7 over June 30, 1962. Although this budget indicates that all personnel will be employed in the Office of the Administrator, maximum use will be made of employees of constituents of the Agency when efficiency or economy will be served.

EXPANSION OF STAFF

Mr. BOLAND. What is the reason for the increase of $89,000?

Mr. STONE. Primarily expansion of staff at the regional or field level, so that we can train selected personnel to be ready to carry out these emergency assignments if an emergency comes. We have been doing a lot of paper planning, so to speak, but this is no good unless we have people at the field level who can start doing the job in an emergency.

Mr. BOLAND. How many people will you have aboard in this program? How many people will you have in the Agency doing this defense planning activity?

Mr. STONE. At the present time I think it is 17 or 18.

Mr. WIECKING. There are 14 at the present.

Mr. BOLAND. This is all they do, defense planning activities?

Mr. WIECKING. Yes, sir.

Mr. BOLAND. You plan, with this addition, to staff some regional offices now to do this sort of thing?

Mr. STONE. We mean to have one person full time in each of our regional offices.

Mr. BOLAND. You do not have any now. This means you will increase?

Mr. STONE. We have three now.

Mr. BOLAND. You have eight regional offices?

Mr. STONE. We have six, normally. We have to conform to the OEP–OCD setup so we have two phantom regions that would come into being in emergency. We would have eight at that time to correspond with their eight.

Mr. BOLAND. How many employees are in the HHFA?

Mr. STONE. About 11,000, I think.

Mr. WIECKING. About 12,000.

Mr. BOLAND. How much of an increase did you ask for in 1963? Do you know?

Mr. WIECKING. In the entire Agency there was an increase of about 2,000 above that.

POSSIBLE ABSORPTION OF CIVIL DEFENSE FUNCTIONS

Mr. BOLAND. Why can't you absorb the four or five that you ask for in this budget? You are asking for about five additional employees for regional offices, I take it. Why can't you absorb the five? You are asking for 2,000 more employees. It seems to me you should be able to absorb it in an agency that has 12,000 employees.

Mr. STONE. This is not a question I can answer. It would be a decision for the Administrator, I think.

Mr. BOLAND. Are there any questions?

Mr. JONAS. Thank you. How long have you been working on this?

Mr. STONE. Actually, since the beginning of 1959. We had no funds at all allocated to this in 1958.

Mr. JONAS. But you had them in 1959 and 1960?

Mr. STONE. 1960 and 1961 and 1962.

Mr. JONAS. How much did you have in 1960?

Mr. STONE. $140,000.

Mr. JONAS. How much in 1959?

Mr. WIECKING. $60,000.

EMERGENCY PLANNING FUNCTIONS

Mr. JONAS. It looks like you would have gotten together some of your plans by now.

Mr. STONE. We have some, sir.

Mr. JONAS. You keep on planning. When will you finish your planning?

Mr. STONE. It is my hope we will finish it.

Mr. JONAS. When?

Mr. STONE. I cannot say for sure but as a guess, based on the present program, and if it is not changed in content, I would say that if we have $250,000 in 1963 that by the end of 1963 we ought to be 90 percent complete on the planning part of it. That does not mean that you do not have later to keep on testing and revising your plans.

Mr. JONAS. What does the plan consist of? What kind of planning are you doing?

Mr. STONE. It consists of a number of things. We could, I guess, file something for the record on that. We have here a statement which shows what we have done, what we are doing this year, what we propose to do next year.

Mr. JONAS. In line with the questions of Mr. Boland, after you get your plans made, why do you need permanent people assigned to this? They are only to be used in the event of an emergency. If the emergency never comes, we won't use them.

Mr. STONE. That is right.

Mr. JONAS. Why couldn't you train one of your regular employees in each regional office and not take on additional permanent employees that you may never need?

Mr. STONE. I am not sure I understand your question.

CURRENT RESPONSIBILITIES OF STAFF

Mr. JONAS. I can understand why you need to make the plans and draw them up and have them on the shelf, but you may never implement the plans. Yet you want to put on additional permanent employees who will have a responsibility in the event of an emergency.

Mr. STONE. These employees have a responsibility now, as well as in the event of emergency. Their responsibility now is to acquaint the regular employees who have designated emergency assignments—and that means nearly everybody in the field office—with what they would be doing after an attack. They have to be told now what they would be doing after an attack and where they would be doing it, insofar as this is possible to do.

This is what our permanent one-man staff in the region would keep on doing. He would be trying to remind the staff people that here are these standby plans which each designated employee is responsible for carrying out in an emergency.

Mr. JONAS. How much of the $250,000 is for salaries?

Mr. WIECKING. $205,000, sir.

Mr. JONAS. What is the other for?

Mr. WIECKING. Other objects of expense, for travel, allocated costs of rent, communications.

TRAVEL COSTS

Mr. JONAS. Why do you have to do so much traveling?

Mr. STONE. I will try to answer that. In this training business, if you call it training, you have to have people in to the regional office for meetings and we have designated the FHA office nearest the State capital in each State to be the emergency office for the whole agency, if there is an emergency. You have to have meetings of not only the FHA people but CFA people and others at least twice a year, I think, to keep them reminded that here is this emergency job that is hanging over them that may never be used, but on the other hand, it may be. This is why the major part of the travel is necessary.

Mr. THOMPSON. Mr. Jonas, your question is a basic one. I think it runs to all the agencies. I wonder if I could try to answer it.

Mr. JONAS. I have just been trying to figure how we could go about finding what the Federal Government pays in 1 year for travel.

NEED FOR TRAINING

Mr. THOMPSON. I was referring to the previous question as to when you get a plan, why do you have to keep working on it. On that one, and this applies, I believe, to all the agencies as it does to a great extent to the DOD. Instead of a standby agency, we are using the regular Government, a total of 33 agencies, as the standby agency. This involves 2½ million people in the Federal Government and 5 million in the State governments. The States are just as much a part of this organization as the Federal Government.

We make our plans and they are no good if we just keep them in Washington. We have to take them out into the field, establish an organization which can function in an emergency and then train the people who are part of that organization. That is the whole 7½ million people.

Mr. JONAS. Why can't you get along with the ones you have on board now? Why do you need additional people?

Mr. THOMPSON. I am talking about the 7½ million people that are on board now that need training. We need specialists in this particular field to do the organizing and training.

These few hundred people that are in special planning and training categories are just a drop in the bucket compared with the total Government employment of 7½ million.

Mr. JONAS. You have 12 people in Washington and you want 3 more. Why can't you get along with 12?

Mr. STONE. These three additional would be working on special projects, special plans that have not yet been prepared.

Mr. BOLAND. What kind of special plans?

EMERGENCY HOUSING

Mr. STONE. In this kind of emergency, there are many ways you might provide housing. One way you might house people would be in simple, austere trailers or movable housing of that type. We at the present time have no drawings or specifications for this type of thing so one of these people would be assigned the job of doing that.

Mr. BOLAND. For what reason? Don't you know how trailers are put together? This should not be very difficult. What do you need planning for trailers for?

Mr. STONE. Trailers now are not simple and not austere. They are not the minimum required.

Mr. BOLAND. What do you recommend for a trailer of this sort? Do you recommend people buy and use this type of trailer instead of what they are now buying?

Mr. STONE. We are talking about a trailer that might be used after an attack in an emergency. I would assume, and I cannot make a flat statement, but I would assume that the local or the State government, or the Federal Government, would be in the business of trying to house the people temporarily and that you would want to house them with the least possible materials and the least possible labor and that you might want to house them——

Mr. BOLAND. You need actual planning to do this with trailers? You have a man actually doing planning on this kind of program or do you intend to put someone on it?

Mr. STONE. We intend to make specifications to build a trailer with the least possible labor and material.

Mr. BOLAND. Will the trailer be built before or after the attack?

Mr. STONE. It will be built after. In order to get going quickly you would need the plans before hand.

Mr. JONAS. You do not plan to stockpile trailers?

Mr. STONE. No, sir; we have no authority to stockpile.

Mr. BOLAND. What will you do with the people in the meantime, between the time of the attack and the time the trailer is built? You are not going to build the trailer overnight, are you?

Mr. STONE. Your first alternative on this is to billet people in existing structures, preferably dwelling structures.

Mr. BOLAND. I would think they would be planning for that rather than for this particular project.

Mr. STONE. We already have plans for that.

Mr. BOLAND. This activity started in 1959?

Mr. STONE. Yes.

Mr. BOLAND. You had no activity in this field prior to 1959?

Mr. STONE. We had some activity.

Mr. BOLAND. How many employees have you had for the past 5 years in this activity?

Mr. WIECKING. At the end of 1959 we had 4; 1960, 8; at the end of 1961, 9; we anticipate having 18 at the end of this fiscal year.

Mr. BOLAND. You intend to put 9 on.

Mr. WIECKING. There are 14 now.

Mr. BOLAND. I do not know why you cannot absorb it with the tremendous number of people you have working with you. Thank you very much, gentlemen.

DEPARTMENT OF THE INTERIOR

WITNESSES

FREDERICK P. HOBART, STAFF ASSISTANT, DIVISION OF SECURITY
JEROME J. O'BRIEN, DIRECTOR, OFFICE OF OIL AND GAS
WILLIAM E. FLORY, DIRECTOR, OFFICE OF MINERALS MOBILIZATION
GARDNER C. GEORGE, DEFENSE POWER COORDINATOR, OFFICE OF THE ASSISTANT SECRETARY FOR WATER AND POWER

Mr. EVINS. It is nice to have you with us, gentlemen.

Continuing with the agencies concerned with civil defense activities, the delegated agencies, next we have with us our friends from the Department of the Interior. We have Mr. Frederick P. Hobart, staff assistant, Division of Security, Mr. Jerome J. O'Brien, Director of the Office of Oil and Gas; William E. Flory, Director, Office of Minerals Mobilization, and Mr. Gardner C. George, Defense Power Coordinator, Office of the Assistant Secretary for Water and Power.

Do you have a statement for us?

Mr. HOBART. Yes, sir; do you want me to file it?

Mr. EVINS. However you wish to proceed.

Mr. HOBART. I have quite a long statement which I will be happy to file and make a few remarks.

Mr. EVINS. It may be received in the record.

Mr. Reporter, receive the statement.

General Statement

Now, if you wish, highlight your remarks.
(The statement follows:)

GENERAL STATEMENT

STATEMENT OF FREDERICK P. HOBART, STAFF ASSISTANT, DIVISION OF SECURITY, DEPARTMENT OF THE INTERIOR, FOR THE DELEGATE AGENCIES FOR THE OFFICE OF EMERGENCY PLANNING

Executive Order 10937, effective February 16, 1962, delegates to the Secretary of the Interior the responsibility for carrying out the Government's mobilization planning functions with respect to electric power, petroleum and gas, solid fuels, metals, and minerals.

These functions also involve day to day activities of the Department which are financed through the regular Department budget. The funds requested in this budget are for specific defense activities over and above those which can be carried with regular Interior funds.

The direct mobilization program financed by transfer of funds from the appropriation for the delegate agencies totals $429,100 for the current fiscal year. The request for the fiscal year 1963 is $486,500, or a net increase of $57,400 over 1962. This request is broken down into four activities as follows:

Office of the Secretary, covering several small items	$53,500
Electric power, which provides for preparedness measures in the field of electric power	53,000
Office of Oil and Gas, covering petroleum and gas	200,000
Office of Minerals Mobilization, covering the fields of solid fuels, metals, and minerals	180,000

The plans being developed and implemented in the fields cited above are designed to develop a state of readiness to meet the conditions of any national emergency, including direct attack on the United States. There follows a brief discussion of the activities for which funds are requested.

OFFICE OF THE SECRETARY

The request for the Office of the Secretary is $53,500 which includes an increase of $24,400 over that available for the current fiscal year. The request consists of $19,000 for continuing the Department's representation at the National Resources Evaluation Center, $17,500 for Radiological Defense Training, and $17,000 for expenses of Interior-paid mobilization personnel.

The representation at the National Resource Evaluation Center is a continuing function and no increase is requested. Regarding the radiological defense training, the Department has been requested to man 325 stations of the Federal fixed station monitoring network. The sum requested is primarily for paying the traveling expenses of employees to locations where they can receive training, and $7,500 for radiological equipment. The expenses of Interior-paid mobilization personnel consist of travel and other expenses of Interior personnel in coordinating the Interior activities with the regional personnel of the Office of Emergency Planning and the Department of Defense.

ELECTRIC POWER

For the fiscal year 1963 certain salaries and expenses relating to defense electric power are included with those of the Assistant Secretary for Water and Power Development.

In addition, there is requested for the fiscal year 1963 the amount of $53,000. This is an increase of $29,000 over the amount available for 1962 from the "Office of Emergency Planning" appropriation.

The President has delegated to the Department of the Interior responsibility for preparedness measures in the field of electric power. Plans are developed, but must be continually implemented to assure prompt restoration of electric power service as soon as possible after an attack. To carry this out, Interior has established a Defense Electric Power Administration. This Administration consists of an active headquarters staff and a standby field organization

which will be activated as conditions warrant during a national emergency. The field organization consists of 16 power areas within the 48 States and one each in Alaska, Hawaii, and Puerto Rico. Each power area is headed by a director, with alternates, to insure continuous direction. These are employed by the Department on a without-compensation basis and devote part of their time to mobilization planning without cost to the Federal Government except for security clearances. At the present time Interior has approximately 40 without compensation employees who devote part of their time to electric power mobilization activities. Mobilization planning and implementation is necessary also on regional and State levels, special power studies are required, and it is necessary to train industry personnel. The organization, coordinating, and training required of the Washington personel is more than can be provided by the current staff and the increase will permit the addition of one professional engineer with a stenographer, and some increase in funds for travel and other expenses.

OIL AND GAS

The estimate of $200,000 is $85,000 more than the amount available for the fiscal year 1962. These funds are urgently needed to assist State, city, and local governments to plan, test, and coordinate with Federal planning their programs for the emergency handling of petroleum and gas. Most of this work must be accomplished at the State, city, and local level.

Current planning provides for the Office of Oil and Gas to serve as the nucleus of a standby Federal petroleum and gas agency to be in readiness to exercise directional control of oil and gas industry operations during a national emergency. Operating in close conjunction would be appropriate State, city, and local government emergency units supervising allocation and distribution of oil and gas to the consumer. Backing up all levels of government would be industry endeavoring to supply products and services as needed.

In carrying out its responsibiilties in Executive Order 10997, the Office of Oil and Gas makes maximum use of its built-in capabilities. The advice and experience of its technical specialists are drawn upon freely and its information materials and studies fully utilized in developing and coordinating national level emergency planning guidance and in providing direction and review of field emergency planning programs.

During the fiscal year 1962, the Office of Oil and Gas has staffed five area offices with an oil and gas emergency planning representative and a secretarial assistant. In fiscal year 1963, funds are requested to staff three more of these area offices so as to have an oil and gas representative in each of the eight area offices to work with State, city, and local officials and representatives of industry.

If the oil and gas emergency planning programs are to succeed, they must have the wholehearted participation of the petroleum and gas industries. Limited guidance dealing with industry survival preparations is provided by our area representatives. However, a specialist in industry facilities protection is urgently needed in the Washington office to prepare manuals for the use of our field personnel and for the development of specific guidance to individual petroleum and gas companies regarding their disaster planning problems. Funds are requested in the fiscal year 1963 to provide an industrial specialist and secretarial assistant for this purpose.

Recruitment for the petroleum and gas unit of the national defense executive reserve must be expanded and reservists trained to carry out their duties in an emergency situation. Fifty to sixty individuals are expected to be nominated during fiscal year 1963 and the estimate includes funds for security checks required for these reservists. Thus far training and orientation of reservists have been confined to their receiving information materials by mail, infrequent participation of Operation Alert exercises and occasional contact with our area representatives. It is proposed to conduct reservist training conferences every quarter in each of the eight area offices during the fiscal year 1963. Funds for travel of full-time employees to conduct these training conferences is included in the budget estimate; however, if any traveling is necessary for executive reservists, it is at their own expense.

Substantial progress has been made in these emergency planning programs thus far during the fiscal year 1962, and the funds requested are urgently needed to continue assistance to State, city, local, and industry officials as well as to inaugurate the programs in the remaining three areas.

OFFICE OF MINERAL MOBILIZATION

The Executive order delegates to the Secretary of the Interior the responsibility for carrying out the Government's mobilization planning functions with respect to metals, minerals, and solid fuels. The Secretary has reassigned to the Office of Minerals Mobilization this responsibility for developing and keeping current preparedness measures.

This $180,000 budget estimate covers these functions:

I. *Preparedness measures.*—The OMM responsibilities are: (1) To insure that in a defense emergency the supply of metals, minerals, and solid fuels will be adequate to meet the Nation's needs; (2) to assist industry in developing and maintaining a capability of responding to the demands of an emergency; and (3) to provide the nucleus of the staff of an emergency organization for metals, minerals, and solid fuels.

II. *Mobilization supply.*—OMM evaluates potential sources of strategic metals, minerals, and solid fuels which would be available in wartime, and measures these sources of supply against estimates of wartime requirements. It makes recommendations for actions necessary to close the gap between foreseeable wartime supply and demand.

III. *Continuity of Industry.*—OMM renders assistance to the metals, minerals and solid fuels industries in developing and maintaining their capability of responding to a defense emergency.

Stockpiles.—OMM assists OEP in formulating and carrying out plans and programs for the stockpile of critical and strategic materials and for survival items.

IV. *Continuity of government.*—OMM is prepared to operate as the Government agency for metals, minerals and solid fuels in an emergency. In this respect, the following programs are carried out:

1. Maintenance of relocation centers for emergency operations: Necessary operating equipment, files, and duplicate documents are maintained in readiness for operation in a defense emergency.

2. Emergency staffing plans: The organization and staffing charts have been prepared and are being kept current.

3. The executive reserve: Senior officials from industry are being recruited and trained for Government service in the metals, minerals, and solid fuels areas. To date 67 have been recruited and the office is in the process of designating and indoctrinating additional persons as reservists.

4. Priorities and allocations: Standby orders have been prepared, and are being maintained on a current basis, to insure that in a defense emergency, the metals, minerals, and solid fuels industries will be in a position to operate smoothly and have adequate materials for operation, maintenance, and repair of their plants as well as for essential construction.

5. Damage assessment: Data on metals, minerals, and solid fuels production facilities necessary to provide damage assessment in event of an attack have been collected and are maintained for OEP's National Evaluation Resources Center.

6. Product and facility ratings: OMM performs staff work for the Industry Evaluation Board for rating products and facilities under its jurisdiction.

7. Solid fuels guidance: OMM plans Federal activities for the handling of solid fuels at the State and local level during an emergency.

NONMILITARY DEFENSE RESPONSIBILITIES

Mr. HOBART. The assignment by Executive Order 10997 of nonmilitary defense mobilization responsibilities to the Department of Interior provides that Interior shall, consistent with the policy direction of the Office of Emergency Planning, prepare national emergency plans and develop preparedness programs covering; one, electric power; two, petroleum and gas; three, solid fuels; and four, minerals.

We are asking this year for $486,500, which is broken down: Office of the Secretary, $53,500; water and power, $53,000; Office of Oil and Gas, $200,000; and the Office of Minerals Mobilization, $180,000.

Gentlemen, that completes my summary.

Mr. EVINS. Has the Department of Interior been concerned with any civil defense functions prior to this delegation?

Mr. HOBART. Prior to this delegation?

Mr. EVINS. Yes.

Mr. HOBART. Yes. We had delegations from the Federal Civil Defense Administration under delegations 3 and 4; the Executive order that came out last year canceled those.

Mr. EVINS. In other words, you have a reemphasis on the same program?

Mr. HOBART. That is right.

We have had some delegation of authority under Executive Order 10480, also.

Mr. EVINS. You have been doing this same type work for 8 or 10 years?

Mr. HOBART. Yes, sir.

FINANCING AND EMPLOYMENT

Mr. EVINS. Your budget for 1961 is shown here.

Do you have the figures for 1960? We are customarily trying to establish your budgets for the last 5 years and your personnel requirements for the last 5 years. This only gives two. It gives 1961, 1962, and projects it for 1963.

Mr. HOBART. 1960 was $373,000.

Mr. EVINS. 1961 is $365,000. Of course, 1962 is $429,100 and projected for 1963 is $486,500.

How about a table for your personnel? How many jobs did you have? How much manpower did you have in 1960, 1961 and 1962?

Mr. HOBART. If we may, we will supply that for the record. I do not actually have it with me.

Mr. EVINS. Do you know how many you have in round figures? You can correct it for the record.

Mr. HOBART. I can give you approximate figures.

Mr. EVINS. For 1962, the present year.

Mr. HOBART. Thirty-five people for fiscal year 1962.

Mr. EVINS. 1961?

Mr. HOBART. I do not have the figures for 1961. It is about the same.

Mr. EVINS. 1960?

Mr. HOBART. 1960 I will have to supply.

Mr. EVINS. Will you supply those for the record? In 1963 you are asking for how many more over 35?

Mr. HOBART. Six.

Mr. EVINS. Six additional jobs?

Mr. HOBART. Yes, sir.

Mr. EVINS. That is 41.

(The information supplied follows:)

The number of positions and the funds made available for the last 5 years are as follows:

Fiscal year	Positions	Available funds
1958	25	[1] $254,100
1959	29	[1] 330,700
1960	29	373,000
1961	33	387,000
1962	35	429,100

[1] Includes funds appropriated to Department of the Interior for Office of Minerals Mobilization.

EMERGENCY PLANNING PROGRAM

Mr. EVINS. You said earlier you had been doing this same study and the same work for about 8 years. Do you not have your reports about compiled, about complete and ready? Haven't you completed your studies?

Mr. HOBART. I will ask these gentlemen, who are in the fields of oil and gas and solid fuels to answer that.

Mr. EVINS. We recognize oil, gas, utilities, and solid fuels are very important in defense. Tell us what you wish to say, gentlemen, that you are doing in connection with the civil defense program.

Mr. O'BRIEN. I am Director of the Office of Oil and Gas.

For the year of 1962 we had 10 employees in our emergency planning program. We are asking for an increase of eight for the year of 1963.

Our emergency program is exclusively in the various areas, in the field. We have eight areas in which we employ and set up an oil and gas man and a secretary—two employees. The rest of our emergency planning is handled by industry; there is no expense attached to that other than the clearances and of this $17,500, we are asking in our budget, which is strictly for clearance expense.

There will be $163,500 of our total budget that will be used for the State and local planning expense in the field; $17,000 is broken down for our Washington office, with two employees, $17,500, the figure I just mentioned for clearances and $2,000 for a long-range study in petroleum reserves, supply and demand, which makes a total of $200,000, an increase of $85,000 over last year. This is to staff three additional area offices we do not have.

Mr. EVINS. Where are these offices located?

Mr. O'Brien. They are broken down into eight areas. Area 1 is Harvard, Mass.; area 2 is Olney, Md.; area 3 is Thomasville, Ga.; area 4 is Battle Creek, Mich.

Mr. EVINS. These are the regular Civil Defense office regional headquarters?

Mr. O'BRIEN. Yes.

Mr. EVINS. Your oil and gas men are in these particular offices?

Mr. O'BRIEN. That is right. He works with the State, local and industry men in that area. His work is all in the field and in case of emergency they are so trained as to immediately take over and handle any emergencies in oil and gas.

Mr. EVINS. We have defense minerals and we have various agencies of Government concerned with oil and gas problems, both at the State and Federal levels. We do not wish to belabor the issue but haven't we pretty much of an inventory, a tabulation or study as to our capabilities and what the Government's requirements are?

Mr. O'BRIEN. We do, but this would be strictly in operation of these facilities in case of emergency. We are set up strictly as an emergency measure to operate those facilities to be sure the oil and gas can get to a certain point.

Mr. EVINS. Thank you, sir.

I believe this pretty much covers the oil and gas. You have it broken down under "C". Do you gentlemen wish to discuss water and power?

Mr. GEORGE. I am Defense Power Coordinator in the Office of the Assistant Secretary for Water and Power, handling the defense electric power functions.

ELECTRIC POWER FUNCTIONS

In general our plans are complete but our big job is the implementation of these plans. The implementation has never satisfactorily been completed due to lack of people to do it.

We have in the field an industry organization of some 2,000 people. We need to visit these people in the field, to interest the various utilities, to educate themselves to handle electric power in a postattack situation.

We have accomplished a great deal in the time that we have been there, but as an old power man, I am not satisfied that we have ever done the job that should be done.

Mr. EVINS. Electric power, both private and public, is certainly essential and all that we can produce is needed. Most of the reports that are called to my attention indicate we have a shortage even at the present time.

Mr. GEORGE. Well, as a matter of fact that is one of the situations that we keep constantly within our attention. Actually, if you look at the reserves in the Nation as of December 31 we had some 28 percent of capability over and above the loads of the Nation.

Should war come these gross reserves would be used up to a large extent. We need about 10 percent at least for spinning reserves and unscheduled outages so today we have about 20 percent of gross reserve over and above loads.

Mr. THOMAS. Mr. George, what knowledge and experience do you have in fallout?

Mr. GEORGE. I have been trained in radiological defense, sir. I have gone around with a team in the Department of the Interior to train the utility engineers, to train instructors in radiological defense, in blast damage, in shelter work, and in radiological detection and I think that while I am not the greatest expert in the world on radiological defense I know quite a bit about it.

FEDERAL GOVERNMENT AND UTILITY COMPANIES' RESPONSIBILITIES

Mr. BOLAND. Do you mean the utilities do not have enough people interested in the same problem? Why do not the utilities pick up the tab on how to deal with fallout? This is their business, whether

it is public or private power. Let them pick up the tab. Why does the Federal Government have to get into a program of this kind? They are the ones who have to reinstate the utilities after disaster strikes. Let them do it, let them do the planning on it.

Mr. GEORGE. If that is what you want, then that is what you should let them do. But in my opinion——

Mr. BOLAND. Let me suggest to you, that is exactly what I want.

Mr. GEORGE. In my opinion these utilities are looking to Government action in this matter.

Mr. BOLAND. This is the only area where they want Government direction.

I have no further questions.

Mr. EVINS. I imagine, Mr. George, when you come out they would welcome your suggestions, counsel and advice and appreciate all the information you provide for them.

Mr. GEORGE. Well, for instance, I am invited to a meeting in Cleveland the 1st of April, and I have been asked to talk upon the Washington picture and what the utilities can do. I am going to Georgia the following week to conduct a radiological training course.

Two weeks later I appear before 110 utilities in Omaha, Nebr., to talk to them on what the utilities can do in this civil defense picture. Without this direction from Government—and we have never had enough of it—I am afraid that the utilities are going to fall down in a postattack situation. There are over 3,000 utilities in this country. We have reached all of the larger ones, but there are innumerable municipality cooperatives, generating and transmission companies we haven't reached. We can reach easily TVA, Bonneville, and the Bureau of Reclamation. They cooperate fine. So do all the utilities, but we need to carry this further.

Mr. EVINS. The point is each might be a little regional or provincial in their outlook and you provide them with some broader facts and information on the national picture.

RELATIONSHIP TO FEDERAL POWER COMMISSION

Mr. THOMAS. Where does the Federal Power Commission enter into the picture?

Mr. GEORGE. Sir, the work of the defense electric power is on the operating side. We have divided our country into 16 power areas and we have added 3 others—Alaska, Hawaii, and Puerto Rico. Each is setup with an area power director from industry. You talk about picking up the tab. We have area power directors who are $35,000 and $50,000 a year salary people who are acting as our area directors at no cost. They are w.o.c.—without compensation.

Mr. THOMAS. Mr. George, that is all fine. I just asked you a very simple question: Where does the Federal Power Commission fit into this picture?

Mr. GEORGE. The Federal Power Commission aids——

Mr. THOMAS. You speak to your specific field in power. The Federal Power Commission's responsibilities are somewhat broader. Where do they fit into the picture if you are doing all this?

Mr. GEORGE. The Federal Power Commission is used by us for all the statistics that they gather. There is no duplication of effort on

our part with what the Federal Power Commission does. They collect statistics, and they have a regulatory function, including licensing of hydroplants. Interior, in its defense electric power, looks to the operations of utilities, a function not performed by the Federal Power Commission. Ours is an operating responsibility. The type of men we have are going to function in the aftermath of a bomb attack, people who would know where the power is, who are used to operation of generating facilities, who are experienced in the operation of transmission lines and the problems of getting around a bombed-out area, where they need to send help to repair the lines. This is not a function of the Federal Power Commission. Ours is an operating situation.

OIL AND GAS REQUEST

Mr. EVINS. You requested and received in the Office of Oil and Gas in 1961 $71,794, and your budget for 1963 in Oil and Gas is $200,000, an increase of $85,000.

We were given a total of new jobs but how many new jobs for your particular department are involved? How many more jobs do you want with the $85,000?

Mr. GEORGE. The $85,000 is for oil and gas. We are only getting two additional jobs for power. Actually, a great part of our work has been carried on by the Interior budget. We never had but $24,000 from the former OCDM budget which this covers. We asked for $53,000. That is water and power. That will provide for three people, but it does carry the expenses, printing and all of the numerous things, even the mailing bill for the materials we have to mail out of Washington.

Mr. EVINS. Are there any questions?

ADDITIONAL EMPLOYMENT

Mr. JONAS. I have just one.

You are a good salesman and you have made a good case, sir, but you haven't made a good case for putting on a crash program. Why can you not go back to the levels of 1961? You were getting along pretty well then and making progress. We are working for the long pull. We are in a cross-country run, not a hundred-yard dash. Why do we have to keep going up every year with stepped up programs? Why not go along with the regular program under which we are making progress? Do you not think we could live with the 1961 figures very well?

Mr. GEORGE. I would be very happy to go back to 1960 figures.

Mr. JONAS. They are a little higher than 1961. We cut you in 1961 and did not damage your program any, did we?

Mr. GEORGE. Sir, the defense electric power——

Mr. JONAS. Will you answer my question?

Mr. GEORGE. I am answering it, if you will pardon me, Mr. Jonas. We had eight people in our program in Washington and in 1961 we had only four people.

Mr. JONAS. That is what I say. We cut you a little in 1961 over 1960.

Mr. GEORGE. No, I am sorry. It was not the appropriations that were cut, four of our people left and they never were replaced.

Mr. JONAS. You had less money in 1961 than in 1960 and you did a good job.

Mr. GEORGE. I do not think we did the job we should have done in 1961.

Mr. FLORY. Your original question was addressed to civil defense. In the field of metals and minerals, the civil defense aspect looms as a comparatively minor aspect. In solid fuels, coal and coke, the civil defense aspect is quite important.

NATIONAL PLAN FOR DISTRIBUTION CENTERS

The program for this year will be to continue to attempt to complete agreements with the States under the national plan which will be basically an agreement between the Federal Government and the State governments as to who will do what in the defense emergency.

The national plan calls for the States, in cooperation with the Federal Government to set up distribution centers at the local levels comprised principally of the coal dealers, who in the defense emergency would make distribution as employees of the Government. They would then call on area people for interarea shipments and a small staff in the Federal Government would ensure a continuous production and an adequate distribution among the areas.

Mr. EVINS. In 1961 your budget was $249,803. For 1962, $261,000 and for 1963 projected, $180,000.

Mr. FLORY. That is right, sir.

JUSTIFICATION MATERIAL

Mr. EVINS. Mr. Reporter, place in the record the material at pages 66, 67, 68, 69, 70, and the summary on page 73, and the minerals on 74.

(The pages referred to follow:)

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(a) Office of the Secretary	$23,138	$29,100	$53,500	+$24,400
(b) Water and power	20,914	24,000	53,000	+29,000
(c) Office of Oil and Gas	71,794	115,000	200,000	+85,000
(d) Office of Minerals Mobilization	249,803	261,000	180,000	−81,000
Total obligations	365,649	429,100	486,500	+57,400

GENERAL STATEMENT

The assignment by Executive Order 10997 of nonmilitary defense mobilization responsibilities to the Department of the Interior provides that Interior shall, consistent with the policy direction of the Office of Emergency Planning, prepare national emergency plans and develop preparedness programs covering:

1. Electric power.
2. Petroleum and gas.
3. Solid fuels.
4. Minerals.

These plans and programs being developed and implemented in the above fields are designed to provide a state of readiness in these resource areas with respect to all conditions of national emergency, including attack upon the United States.

The Executive order provides that: "Emergency plans and programs, and emergency organization structure required thereby, shall be developed as an integral part of the continuing activities of the Department of the Interior on the basis that it will have the responsibility for carrying out such programs during an emergency."

With the exception of planning for the continuation of the essential functions of the Department, and coordinating electric power planning with other Federal power agencies, all programs are carried on through the voluntary cooperation of private industry.

An attack on this country would bring serious disruption to lines of supply of fuels, and electric power. Large areas of the country, military and Atomic Energy Commission installations would be without fuel and power. Basic planning on how to remedy this situation in the shortest time possible and take those actions preattack, the need of which can be foreseen, is the essential work which must be done now.

While it is evident that the attack itself cannot now be foreseen, actions can be carried out on the basis of hypothetical studies which materially aid in developing realistic plans to insure, insofar as is possible, fuel and energy to essential uses under conditions of attack.

Inherent in the restoration of the economy and the continuation of the military machine is an adequate supply of metals and minerals. Continuous studies are necessary to determine if the levels of our stockpiles are adequate and necessary, and to insure an adequate supply of metals and minerals under various wartime assumptions.

Basic mobilization planning in Interior's assigned activities on the Federal level is largely complete and is formally recorded through an annex (33) to the national plan for civil and defense mobilization. Necessary now is the carrying of these plans to OEP regions and to the States in order that actions on those levels will be coordinated with national plans. Also, it is necessary to implement to the extent possible the plans developed with the industries with which we deal. The industries concerned—electric power, petroleum and gas, solid fuels, and minerals—are spread throughout all sections of the United States. They must receive information on national policies, definite plans and should take actions now to minimize the effects of an attack on this country.

Funds transferred to Interior for the fiscal year 1962 total $429,100. The request for 1963 totals $486,500 or an increase of $57,400. Details of the request follow:

DETAIL OF REQUIREMENTS

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(a) Office of the Secretary	$23,138	$29,100	$53,500	+$24,400

The funds requested for the Office of the Secretary are required for the following items:

(1) *National Resource Evaluation Center, $19,000.*—The amount of $19,000 is requested to continue Interior's representation at the National Resource Evaluation Center. The Department has had one professional employee, with part-time secretarial assistance, located at the center, and these employees are responsible for processing data in the fields of electric power, metals and minerals, petroleum and gas, and fisheries for insertion into the computer. While much of this data is already in the machine, it is necessary contniually to up-date this data and to gather additional data in order to obtain complete coverage in all essential areas.

(2) *Radiological defense training, $19,500.*—The Department of the Interior has been requested by the Office of Civil and Defense Mobilization to man 325 stations of the Federal fixed station monitoring network designed to map promptly the national fallout situation resulting from a nuclear attack. This responsibility is being continued under the direction of the Department of Defense. The sum requested is mainly to pay the traveling expenses of employees to locations where they can receive training, and it also includes $7,500 for radiological equipment. It is estimated that the amount requested will cover the training of about 80 employees. This is a continuous actviity within the

Department due to the number of personnel requiring training, refresher courses, and the necessity of training new personnel to replace those who leave Government employment or who are transferred to other locations. No personnel will be employed and no salaries will be paid from this fund.

(3) *Expenses of Interior-paid mobilization personnel, $17,000.*—The regions and areas of the Department's bureaus, and for the most part, those of Interior's mobilization agencies, cannot, because of their particular function, correspond to the regions of the Office of Civil and Defense Mobilization, now Office of Emergency Planning. Since there may be from 3 to 11 different Interior regions, or parts of regions, within or as a part of one OEP region, it has been necessary for the Department to establish one single contact point for coordination and the flow of information from the Department to OEP and now Department of Defense also, and from these agencies to the Department.

No new positions are set up for this activity but the Department draws on the bureaus operating in the field for personnel who can devote part of their time to this activity. Their salaries continue to be paid by the individual bureau or office furnishing the employees. However, it is not possible for the bureau to absorb the extra expenses (over and above the salaries) necessary for these employees to satisfactorily carry on these defense functions. The same situation exists with respect to part-time mobilization personnel in the Washington office. The funds are requested, therefore, to cover travel expenses primarily of these Interior employees when conducting defense business, and also for communications and printing or reproduction work.

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(*b*) Water and power	$20,914	$24,000	$53,000	+$29,000

The Department has been delegated responsibility for preparedness measures in the field of electric power. Plans must be developed and actions which can be carried on now must be taken for prompt restoration of electric power service as soon as possible after an attack. To effect policy coordination for preparedness planning and control for restoration of power service after an attack, Interior has established a Defense Electric Power Administration, on a standby basis, which will be activated as conditions warrant during a national emergency. The main operating part of this standby Administration is the field organization consisting of 16 power areas throughout the United States. Area power directors and alternates are employed by the Department of the Interior on a without-compensation basis. These w.o.c.'s are employees of utilities devoting part of their time to mobilization planning and action without cost to the Federal Government, either for salaries and other expenses, except for security clearances which are secured by Interior. In all, approximately 50 w.o.c. appointments are necessary and to complete this number and provide replacements, it is estimated that approximately 10 security clearances will be required during the year.

Much of the mobilization planning is carried on at the State and local level and meetings and conferences with Federal and State officials are necessary to develop plans and the organizations for defense mobilization and to keep these current. It is necessary also to bring a radiological monitoring capability to electric power industry personnel. Interior personnel train instructors in the industry who in turn instruct monitors within their utility. Another area of responsibility is that of special power studies in relation to national defense in various parts of the Nation where the electric power supply is or may become critical. These studies are performed under the direction of the Technical Inter-Agency Power Group which is composed of technical representatives from five Federal agencies, with Interior supplying the Chairman and the bulk of the staff work.

At present, defense electric power functions in the Washington office are carried on by employees on the regular departmental roll who spend part of their time in mobilization activities. One additional employee is stationed in OCDM Region 5 where he is engaged in full-time mobilization work in that area. His salary and expenses have been covered by the allocation from OCDM, now OEP. For the fiscal year 1963 funds are requested to employ one additional professional engineer and a clerk-stenographer in the Washington

office. Due to the shortage of personnel in the Washington office, it is not possible to keep up with actions on the regional level nor to provide fully information and help to the area power directors who are spread throughout the United States. Additional help is due these w.o.c. employees who expect their guidance and assistance to come from Interior, and unless this help is provided, the organization and planning soon lapses and becomes ineffective. Considerable travel is required and the funds provide for this together with that required for communications, printing, security clearances, and the necessary supplies, and other services.

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(c) Office of Oil and Gas	$71,794	$115,000	$200,000	+$85,000

Emergency planning.—In carrying out its normal functions, the Office of Oil and Gas develops much information having application to programs being conducted to discharge Interior's delegated responsibilities under Executive Order 10997 for planning petroleum and gas mobilization readiness. However, funds heretofore have not been available to provide the Office with adequate capability to develop and coordinate all aspects of planning guidance required or to carry on mobilization activities in the field. It is in the field where practical arrangements for the emergency handling of petroleum and gas must be worked out. Here at State and local government levels and in industry are persons likely to have responsibility for implementing such readiness measures in wartime.

Importance of petroleum and gas.—Petroleum and natural gas currently constitute the source of approximately 73 percent of all energy used in the United States and conservative forecasts of future demands indicate our Nation will become more, not less, dependent upon oil and gas to meet its energy requirements.

Our very way of life is built upon the assumption of adequate supplies of petroleum and gas: 72 million passenger automobiles, trucks, and buses jam our streets and highways; the railroads operate mostly on fuel or diesel oil; water movement from the small outboard to the huge ocean liner is based mostly on oil fuel; and air travel as we know it today depends entirely on high test gasoline and jet fuel. Motive power for the factory and mechanization on the farm are provided by the internal combustion or diesel engine and the electric motor. As for electricity, 25 percent of all the power produced is generated with oil and gas. Space heating, formerly provided largely from coal, and then oil, is rapidly becoming the special preserve of natural gas and this heavy dependence, too, must be taken into account in developing plans for Government and industry, working together, to meet essential oil and gas requirements in a national emergency.

Adequate oil was an indispensable factor in winning World War I and World War II, and the availability of petroleum and gas to meet essential needs for civilian survival, military operations, and reconstruction would be vital in event of nuclear conflict. In both World Wars and the Korean crisis however, there was ample time to mobilize after war began. A third world conflagration, on the other hand, could start with a no-warning nuclear attack, followed up possibly by biological and chemical weapons. Hence, the imperative need to have an adequate mobilization mechanism ready, tested, and in effect before the beginning of hostilities.

Emergency organization.—Current planning provides for the Office of Oil and Gas to serve as the nucleus of a standby Federal petroleum and gas agency, to be in readiness, if needed, to exercise directional control of oil and gas industry operations during a national emergency. Operating in close conjunction would be appropriate State and local government emergency units supervising allocation and distribution of oil and gas to the ultimate consumer. Backing up all levels of government would be industry endeavoring to supply products and services as needed. Personnel to staff the Federal Government's standby organization is being recruited largely from industry, although other sources of manpower are also being drawn upon such as government, the professions, universities, labor, etc.

In carrying out its assignment to plan for the emergency mobilization of oil and gas resources, the Office of Oil and Gas makes maximum use of its built-in capabilities. The advice and experience of its technical specialists are freely drawn upon and its information, materials, and studies fully utilized in preparing the Office of Oil and Gas to serve as the nucleus of an emergency petroleum and gas agency; in developing and coordinating national level mobilization planning guidance; and in providing direction and review of field mobilization programs.

Cooperation with State and local emergency planning agencies.—During fiscal year 1962, the Office of Oil and Gas has five mobilization representatives and a secretarial assistant in the field with delegate agency funds, one each in areas 1, 4, 5, 6, and 7. In fiscal year 1963 funds are being requested to add three more of these field people so as to have one in each of the eight areas; and to provide them with more nearly adequate office expense and travel allowances. Working closely with representatives of government and industry our area mobilization representatives—

(1) Advise the Office of Emergency Planning area directors as to integration of oil and gas in area plans;

(2) Assist State and local governments to plan, test, and coordinate with Federal planning, their proposed arrangements for the emergency handling of petroleum and gas;

(3) Provide industry with advice and assistance for setting up, and assuring the feasibility of plans to enable continuance of operations during and after nuclear attack;

(4) Assist in the recruitment, training and orientation of executive reservists expected to man a Federal emergency organization to meet essential demands for oil and gas during a national emergency.

Fieldwork in promoting oil and gas mobilization readiness has been impressive thus far during fiscal year 1962 although restrictions on travel may prevent effective followup in many instances of initial planning effort. Requests for assistance from State and municipal authorities are very much on the increase. Joint Federal-State oil storage surveys were begun in five areas. Analysis of the data developed by the National Petroleum Council on oil storage was completed and the information is being utilized in support of our mobilization plans. A project to plot precise locations of all important oil and gas facilities on large scale maps, scale 1:250,000 for each of the eight areas and the entire United States is nearing completion. Many oil and gas companies adopted survival plans and an increased number participated in Operation Alert exercises including tests at community level. Acceleration of the preparation of area plans and annexes increased the requirement for joint planning with the Office of Emergency Planning area offices.

Executive reserve.—Recruitment for the petroleum and gas unit of the national defense executive reserve must be stepped up and a useful program of training inaugurated. Fifty to sixty individuals are expected to be nominated during fiscal year 1963 for the petroleum and gas executive reserve which requires top secret clearance. Thus far, training and orientation of reservists has been confined to their receiving information materials by mail, infrequent participation in Operation Alert exercises and occasional contact with Office of Oil and Gas field representatives. If reservists are to perform their duties effectively under conditions imposed by nuclear attack, they need to be familiar with emergency Government procedures and knowledgeable regarding what to expect in carrying out their assignments in a modern no-holds-barred war. It is proposed to conduct reservists' training conferences every quarter in each of the eight Office of Emergency Planning areas and in Washington during fiscal year 1963. Funds for travel of full-time employees in connection with the conduct of these training conferences is incorporated with travel allowance being requested for field personnel. However, funds are not included for traveling expenses for executive reservists.

Industry survival.—If the oil and gas mobilization readiness program is to succeed, it must be considered realistic and feasible of implementation by those in government at Federal, State, and local level and those in industry expected to be involved in emergency operations. Most important single element in attaining the goal is the wholehearted participation of the petroleum and gas industries. Their personnel are expected largely to staff Government emergency oil and gas agencies and the companies themselves are expected to furnish enough oil and gas to meet emergency requirements.

Limited guidance dealing with industry survival preparations, based on Washington advice, is provided by our mobilization representatives, but neither we nor our field people are experts in this profession. A specialist in industry facilities protection is urgently needed in Washington, capable of preparing manuals for field use and developing specific guidance to individual petroleum and gas companies regarding their disaster planning problems. Funds are requested to provide an industrial specialist and secretarial assistant for the Washington office for these purposes.

Area offices.—Funds are requested to provide a petroleum and gas representative and a secretarial assistant for each of three Office of Emergency Planning area offices in order to complete the staffing of all eight offices. These representatives furnish technical advice to members of the Office of Emergency Planning regional staff and participate with them in the integration of petroleum and gas plans with the overall plans for the area; work with emergency planning officials at State and local levels in the development of resource management programs; assist petroleum and gas industry officials in survival planning and the development of mutual-aid programs; assist the Office of Oil and Gas in the selection and training of petroleum and gas executive reservists.

Summary of increases

Program activity	New positions	Personnel compensation	Personnel benefits	Other expenses	Total increase
Emergency planning:					
Washington	2	$16,000	$1,000		$17,000
Field	6	45,000	3,000	$20,000	68,000
Total	8	61,000	4,000	20,000	85,000

A $5,000 increase for travel and transportation of persons will be needed for field personnel to meet with State, local, and industry officials on defense mobilization and industrial survival problems.

Other increases urgently needed are: Printing and reproduction ($1,000) for data and information for use of the executive reservists (150) and eight area offices, communications ($4,000) for use of the staff in eight area offices for liaison with State, local, city, and industry officials and with the area executive reservists, other services ($7,000) for long-range petroleum study and security checks for executive reservists, office supplies ($2,000), equipment ($1,000), and ($4,000) for personnel benefits for the additional personnel.

	1961 actual	1962 estimate	1963 estimate	1963/1962 difference
(d) Office of Minerals Mobilization	$249,803	$261,000	$180,000	−$81,000

The estimate of $180,000 will provide funds for carrying out mobilization functions in the fields of metal, minerals, and solid fuels.

Nature of program.—The necessity for having adequate supplies of metals, minerals, and solid fuels has been amply demonstrated in past wars. The Office of Emergency Planning has delegated to the Secretary of the Interior authority and responsibility for plans, recommendations, and programs to assure that adequate supplies of critical and strategic metals and minerals and solid fuels will be available to meet essential civilian and military requirements in any of the various kinds of defense emergencies likely to confront the Nation. This responsibility has been redelegated to the Office of Minerals Mobilization, together with other mobilization-related responsibilities of the Secretary.

Scope of activities.—The Office of Minerals Mobilization carries out its responsibilities under broad policy guidance from the Office of Emergency Planning, the Department of Defense, and the Secretary of the Interior. The Office operates under the immediate supervision of the Assistant Secretary for Mineral Resources. The principal areas of its responsibility are—

(1) To evaluate the extent to which the production from domestic minerals, metals, and solid fuels industries, supplemented by imports and with-

drawals from Government stockpiles will be able to meet anticipated essential civilian and military requirements under various defense emergency and mobilization conditions.

These evaluations serve as the basis for periodic or special recommendations by the Secretary of the Interior to the Office of Emergency Planning on such matters as stockpile procurement programs; actions to support the domestic production component of the mobilization base and the maintenance of the Government's stockpile of critical and strategic metals and minerals.

(2) Assist the OEP in formulating and carrying out plans for (*a*) stockpiling of strategic and critical materials and (*b*) the stockpiling of essential survival items.

(3) Maintain a capability to assess the effects of attack on assigned products, producing facilities, and departmental installations both at national and field levels, and provide assistance as appropriate to the National Resource Evaluation Center of OEP and to OEP field offices.

(4) To participate in the Department's radiological monitoring program by training members of the electric power, solid fuels and oil and gas industries as instructors, so that they in turn, can teach their employees the proper methods for the detection of radiological contamination.

(5) To provide for the continuity of production of minerals, metals, and solid fuels under emergency conditions. The Office develops and keeps current standby orders, regulations, and programs to be placed in effect in an emergency and provides detailed data for evaluating surviving resources in the event of a nuclear attack. It also assists the industry in providing for continuity of production, and participates in the evaluation and rating of production facilities within the minerals and solid fuels industries by the Industry Evaluation Board.

(6) To provide continuity of Government in the event of an emergency by participation in test alerts; by maintaining in readiness duplicate records and documents at a relocation site; and by recruiting and training an executive reserve from key segments of the respective industries for which the office has mobilization responsibilities.

(7) Provide guidance and leadership to assigned industries in the development of plans and programs to insure the continuity of production in the event of an attack, and cooperate with the Department of Commerce in the identification and rating of essential facilities.

(8) To plan and direct Federal activities for the handling of solid fuels supplies at the State level during an emergency situation, consistent with the provisions of the emergency plan for solid fuels as set forth in annex 33 to the national plan.

(9) To advise and assist other offices and agencies of the Government in planning and implementing programs involving the metal, mineral, and solid fuels industries under defense emergency conditions.

(10) Adapt OEP industry protection guidance material to needs of industries concerned with assigned products, and promote a national program to stimulate disaster preparedness and control in order to minimize the effects of overt or covert attack and maintain continuity of production and capacity to serve essential users under emergency. Guidance shall include but not be limited to: organizing and training facility personnel, personnel shelters, evacuation plans, records protection, continuity of management, security, emergency repair, dispersal of facilities, and mutual aid associations for emergency.

(11) Prepare plans to claim materials, equipment, supplies, and services needed in support of assigned responsibilities and other essential functions of the Department before the appropriate resource agency, and work with such agencies in developing standby programs to insure availability of such supplies and services in all emergencies.

(12) To maintain for the Department's use, statistics, records, and reports on mobilization programs.

To perform staff work and provide other services and advice to the Assistant Secretary for Mineral Resources on mobilization aspects of policy and program problems in the metals, mineral, and solid fuels areas.

Mr. EVINS. Thank you, gentlemen, very much.

Department of Labor

WITNESSES

HARRY WEISS, DEPUTY ASSISTANT SECRETARY FOR INTERNATIONAL LABOR AFFAIRS
V. S. HUDSON, DEPUTY ADMINISTRATIVE ASSISTANT SECRETARY

Mr. Evins. Continuing the budget justification for civil defense, delegated agencies, we have Mr. Harry Weiss, Deputy Assistant Secretary for International Labor Affairs and Mr. V. S. Hudson, deputy administrative assistant to the Secretary.

Mr. Weiss, you may proceed and give us your statement.

Mr. Weiss. Mr. Chairman, I would like to put this statement into the record, if I may, and speak informally about one or two major points.

GENERAL STATEMENT

Mr. Evins. You may do so. Also put in the record the table at pages 87 and 88, the narrative statement on page 89, and pages 91, 105, and 106.

(The material referred to follows:)

GENERAL STATEMENT

STATEMENT OF HARRY WEISS, MOBILIZATION COORDINATOR, U.S. DEPARTMENT OF LABOR

For the first time since fiscal year 1959 the Department of Labor is making its request for civil and defense mobilization funds directly to the Congress.

Its only source of funds has been the coordinating agencies charged with overall planning for emergency conditions; namely, FCDA in 1956 and 1957; OCDM in 1959, 1960, and 1961; and the Department of Defense and the Office of Emergency Planning in 1962.

In 1960 funds were made available to the Department on a consistent basis. On the assurance that we would have funds available on a continuing basis, the Department established defense mobilization coordinating positions in each key bureau of the Department and created in the Office of the Secretary a small staff for central coordination of the overall civil and defense mobilization program of the Department. In addition, civil defense planning units were established in each of the 50 State employment security agencies. To assist these agencies, an individual coordinator was provided in eight regional offices of the Bureau of Employment Security. These representatives are also responsible for working with the eight regional organizations of the Office of Emergency Planning (formerly OCDM) and the Department of Defense—Office of Civil Defense. These State and bureau mobilization coordinators are responsible for the development of specific emergency planning programs under the overall control and direction of the Department. It may help to outline our overall program by describing the activities underway at the present time and our proposals for fiscal year 1963.

The Department of Labor's emergency responsibilities may be grouped under three principal headings—manpower management, economic data in support of policy, and operations, and wage stabilization and labor-management relations. These responsibilities are among the most essential elements in planning for the Nation's survival and recovery in the event of a nuclear emergency.

Manpower, the common ingredient of all production planning, must be in sufficient quantity, properly utilized, to meet the emergency needs of the country. It is our responsibility for insuring plans for the availability of adequate manpower to carry out emergency tasks whose planning and control are assigned to other Federal agencies.

Similarly, the maintenance of economic stabilization will be essential for the postattack environment if we are to utilize effectively the country's nonhuman resources and maintain the morale of the people. The Department has responsibility for insuring the stabilization of wages and salaries in the overall stabilization program and the more effective cooperation of labor and management through sound policies and practices developed in advance of the emergency.

The responsibility for developing economic data in support of policy and operations is essential for providing those responsible for manpower management and for the execution and enforcement of the wage stabilization provisions of economic stabilization with the necessary guides for proper decisionmaking. In addition, the development of adequate statistical information after an emergency ensues is essential for other agencies of government dependent on an evaluation of economic circumstances for the carrying out of their emergency responsibilities.

Planning for the emergency management of the labor force is assigned to units in Washington and in State employment security agencies working on development of emergency procedures in the recruitment and utilization of the labor force. An average of $11,500 per State is the cost of personnel in each State civil defense manpower planning unit engaged in completion of manpower annexes to State survival plans and in preparing local offices for operations under postattack conditions.

The planning by the State employment security agencies, the manpower operating arm of the Department, is guided and controlled by the overall plans of the Department, prepared by experts at the national office. Guidance is provided directly by field representatives, at a cost of $117,000 for eight professional manpower technicians who also participate in the preparation of regional planning conducted by DOD–OCD and by OEP.

Funds totaling $103,500 are utilized in Washington for the preparation of a great number of separate programs, including plans for the installation of task forces—preassignment of members of the labor force to specific activities in the event of a nuclear emergency; development of procedures for the expeditious recruitment and utilization of women and teenagers not part of the preattack labor force; development of a plan of compensation payments for injury or death of authorized civil defense workers during an emergency; development of plans for evaluating adequacy of local resources to meet estimated civil defense requirements as determined by the Department of Defense; establishment of the basis for on-the-spot reporting to the National Resource Evaluation Center of manpower resources surviving after an attack; development of an emergency manpower organization and emergency relationships with other agencies; development of the most equitable and effective procedures for compulsory assignment of manpower if necessary in an emergency; and preparation of instructions to State agencies for the use of labor market controls as required.

For 1963, the Department proposes to change emphasis from the development of programs to the completion and installation of specific plans. Of most importance will be the installation of task forces in approximately 50 communities. Of the $1,285,000 requested by the Department, $1 million is for emergency management of the labor force. Of this $1 million, the installation of task forces will require $350,000, $100,000 would be utilized by the Bureau of Apprenticeship and Training and $250,000 would go to the Bureau of Employment Security, mostly for actual installation expense by State agencies. An additional $450,000 would be granted to State agencies for the maintenance of State civil and defense mobilization planning units engaged in completion of plans for adapting peacetime organization and operations to emergency conditions, and in installing these plans at local offices. Regional assistance would cost $117,000. The remaining $83,000 requested would provide funds for the completion of programs initiated in 1962 and for the continued national office coordination of the State programs.

The economic data programs in 1962 are budgeted at $125,000. These programs provide for the development of estimates of available manpower by occupation for use by the National Resource Evaluation Center in its essential program for rapid assessment of surviving resources in the event of an attack. Numbers of workers by occupation are estimated for each metropolitan area in order that we may have a comprehensive national picture as well as significant economic data for specific localities.

Combined with these estimates of numbers, the Department is attempting to determine the probable productivity of the surviving labor force in order that those responsible for the determination of essential programs may have better ideas of what manpower resources will be needed in the postattack period.

For fiscal year 1963, $139,000 is requested for these economic data programs. The previously prepared estimates of occupation by geographic area will be updated in accordance with more recent information obtained from the latest census. In addition the Department's Bureau of Labor Statistics will provide the National Resource Evaluation Center and its contract agency engaged in developing an economic picture of the postattack environment, under closely defined assumptions, with updated estimates of occupational data by detailed manufacturing and nonmanufacturing categories in accordance with recent census data. The Department will continue the very complex study of the factors that affect productivity under postattack conditions, particularly the effects from disruptions in the supply of raw materials and energy. Technical assistance to the National Resource Evaluation Center would also be continued.

In 1962, the Department has allocated $50,000 for the completion of wage and salary stabilization plans and operating procedures and for the development of labor-management relations programs for effectively minimizing disputes in an emergency. In 1962, the basic wage stabilization plans, already formulated, were prepositioned in the field for emergency use. Field personnel of the Department are receiving initial training in the application and enforcement of the proposed wage stabilization procedures. In 1963, these training programs will be continued. An effective labor-management relations program is in the formulation stage and should be completed in 1963. The Department is asking that the present rate of expenditures be continued for these activities.

The Office of the Secretary is responsible for the overall planning of the Department's mobilization program. In the Office of the Under Secretary, the Department's Office of Manpower Administration is responsible for the multitude of activities related to developing a coordinated program, establishing procedures for the allocation of funds and the maintenance of control over programs, liaison with other agencies responsible for civil and defense mobilization planning, recruiting and training executive reservists, maintaining at the OEP classified location a senior representative fully informed of the Department's responsibilities and able to initiate emergency actions if necessary, and developing and maintaining an emergency organization structure. These are continuing activities. For these activities, the Department allocated $153,878 in 1962. In 1963, the Department will continue its central coordination and direction on a much reduced scale. $96,000 is requested for the maintenance of the overall readiness planning unit in the Office of the Under Secretary.

These are the essential programs for which we request funds in 1963. The detailed descriptions of these programs are available in the attached budget statement.

A great deal of time and effort has been expended in the recruitment and training of the civil and defense mobilization staff already on the job in Washington, in the field, and in the State employment security agencies. They should be continued in their present activities in accordance with the conservative budget estimates proposed for fiscal year 1963.

The overall civil and defense mobilization planning program consists of a number of essential elements, none more important than manpower. For it is manpower of all productive elements that is the essential ingredient of any productive system. We feel that all of our emergency planning responsibilities, all of which are manpower oriented, are essential for the survival of the Nation in the event of a nuclear war. We therefore urge very strongly that our request for funds for fiscal year 1963 be supported by your committee.

SUMMARY OF THE ESTIMATES

Salaries and Expenses, Office of Manpower Administration

Amounts available for obligation

	1962	1963
Comparative transfer from "Office of Civil Defense, Department of Defense," and from "Office of Emergency Planning"	$978,348	
1963 estimate		$1,285,000
Total estimate	978,348	1,285,000

Obligations by activity

Description	1962		1963		Change	
	Positions	Amount	Positions	Amount	Positions	Amount
1. Emergency management of the labor force	19	$649,500	31	$1,000,000	+12	+$350,500
2. Economic data in support of policy and operations	15	125,000	17	139,000	+2	+14,000
3. Wage stabilization and labor-management relations in an emergency	5	50,000	5	50,000		
4. Central programing and coordination	13	153,848	9	96,000	−4	−57,848
Total obligations	52	978,348	62	1,285,000	+10	+306,652

NOTE.—Fiscal year 1962 allocation shown with parent account in the President's budget.

Obligations by object

	1962	1963	Change
Total number of permanent positions	52	62	+10
Average number of all employees	48	60	+12
11 Personnel compensation	$448,308	$508,496	+$60,188
12 Personnel benefits	33,894	38,621	+4,727
21 Travel and transportation of persons	41,595	47,485	+5,890
22 Transportation of things	1,500	800	−700
23 Rent, communications, and utilities	3,745	22,050	+18,305
24 Printing and reproduction	3,050	4,250	+1,200
25 Other services	11,448	3,950	−7,498
26 Supplies and materials	4,708	5,248	+540
31 Equipment	1,100	4,100	+3,000
41 Grants, subsidies, and contributions	429,000	650,000	+221,000
Total obligations	978,348	1,285,000	+306,652

Summary of changes

Comparative transfer from Office of Civil Defense, Department of Defense, and from Office of Emergency Planning	$978,348
1963 estimate	1,285,000
Total change	+306,652

Program items:

Increase:

Activity 1. To accelerate the rate of installation of task force plans, from 5 communities in 1962 to 50 communities in 1963, and to improve initial staffing of State defense readiness units responsible for achieving emergency readiness (12 positions and $350,500, including $221,000 for grants to States) +350,500

Activity 2. To facilitate the rate of completion of projects for providing NREC with manpower data (2 positions and $14,000) +14,000

Decrease: Activity 4. The decrease of 4 positions and $57,848 is achieved through a greater delegation of responsibility to the bureaus for direct negotiations with other Federal agencies on civil and defense mobilization activities (−4 positions, −$57,848) −57,848

Total change +306,652

Activity 1–a. Task Force Development

(1962, $12,000; 1963, $350,000)

NARRATIVE DESCRIPTION OF PROGRAM

There is no need to establish, insofar as possible, a built-in manpower readiness in those geographic areas which are most likely to feel the manpower impact of a large-scale enemy attack on this country. For the most part, these places are the areas which will not have suffered the direct effects of an attack, but whose population and economy will have nonetheless been substantially disrupted. These communities must have an immediate capability to organize and carry out survival activity for massive influxes of evacuees as well as for their own populations. Such a built-in readiness can be achieved in large measure through the preassignment, in peacetime, of civil defense responsibilities to cadres of workers who will be immediately able to function as teams in carrying out urgent survival work. The major technique involved in the project includes the identification, in such areas, of groups of workers already functioning in this manner and having a peacetime mission which is the same as or is closely related to the types of survival activity for which there is likely to be a demand. After the identification of such groups, arrangements must be completed with them or their representatives, and with their employers, to insure their immediate availability (if attack conditions permit) to work as survival teams in an emergency. These arrangements will include the provision of any necessary training, including the reorientation of their activity toward a postattack environment and its modification where it is closely related to, but not the same as, the contemplated survival work.

Pilot studies have been conducted in Allentown, Pa., Tallahassee, Fla., and Kalamazoo, Mich. The first two of these studies involved the organization of workers in the construction trades; the third was an OCDM plan for organizing the entire community including materials and equipment as well as manpower. On the basis of experience in these three studies, it is possible to proceed with the development of the manpower readiness aspects of this type of community organiaztion in all activities which are likely to be essential for postattack survival and in all communities which are likely to be centers of postattack survival activity.

CHANGES FOR 1963

Field staff of the Bureau of Apprenticeship and Training will be used to organize groups in the construction industry. Staff of the State employment security agencies, affiliated with the Bureau of Employment Security, will organize groups in all other civil defense functions. State agency representatives will be assigned as necessary to each of 50 State civil defense administrative subdivisions which include or adjoin one or more target areas and therefore encompass several reception areas. One-tenth of a man-year of professional time (plus clerical support) will be assigned to each such geographic subdivision be field staff of the Bureau of Apprenticeship and Training. The work will be coordinated and directed by a national office staff of five professional workers with two clerical assistants. The task will continue beyond fiscal year 1963 until task force groups have been organized and committed in each of the hundreds of reception areas which will have been designed by that time in local survival plans.

1963:

National office: 6 positions, $47,200; nonlabor, $10,975.
Field office: 8 positions, $61,400; nonlabor, $18,425.
State agencies: 25 man-years, $162,000; nonlabor, $38,000.

Activity 1–b. Allocation and Distribution of Manpower

(1962, $15,000; 1963, $16,900)

NARRATIVE DESCRIPTION OF PROGRAM

State employment security agencies and their local employment offices must have effective procedures for channeling and distributing the surviving labor force, to the most urgent needs, in those areas where postattack shortages will occur. Priorities will be determined by the civil defense and mobilization officials who have responsibility for directing programs for military support,

for survival, for restoration, and for recovery. These proceedings must include arangements for management of manpower supplies under circumstances vastly different from those under which the World War II employment stabilization programs were effective. Accordingly, a system of manpower controls must be devised which can be relied upon completely as a device to insure that workers will be employed where they are needed most in a general war situation. The system must recognize the possible austerity of postattack existence, the varying possible economic background situations, and the emotional and psychological factors influencing workers' attitude after an attack. At the same time, the readiness of State employment security agencies for limited-war operations must be promoted and maintained, through an intensive followup on the procedural guidance for such operations which will have been given them in fiscal year 1962. Such followup will need to include the provision of individualized assistance to the States in the installation of operating procedures developed by them to implement the Federal guidance materials. In fiscal year 1963 studies will continue, as initiated in 1962, on the experiences of other countries in conscripting manpower. These studies will include exploration and analysis of these foreign experiences in relation to the economy, philosophy, history, and nature of probable needs of the United States.

CHANGES FOR 1963

Analyses will be made of the circumstances underlying the installation of each of the manpower control measures employed in World War II (e.g., priority referral, manpower ceilings, statements of availability, and extension of the workweek). The foundations, objectives, and methods of application of each of these controls will be related to the potential contingencies of a postattack situation to reveal the degree of their applicability as well as their weaknesses and to point out directions for strengthening them or developing new types of controls. At the same time, staff guidance will be provided to assist State employment security agencies in installing in their local offices the procedural materials which the States prepare, based on the guidelines issued by the Department in 1962 for adapting local office employment service operations to meet a period of full mobilization under conditions short of general war.

1963, no positions; nonlabor $1,900.

EXPLANATION OF ESTIMATE BY OBJECT

Personnel compensation, $508,496

The estimate will provide 62 full-time positions or 60.1 net man-years. Of this, 44.2 man-years and $346,535 are allocated to departmental services and 15.9 man-years and $143,961 to field offices.

Personnel benefits, $38,621

This estimate is based upon personnel compensation and will provide for the following contributions:

CSC retirement fund	$32,831
Employees' life insurance	1,970
Employees' health benefits	3,820
Total	38,621

Travel and transportation of persons, $47,485

The estimate provides for per diem, mileage, parking fees and transportation costs for 24 departmental and 13 field full-time personnel. The estimate will also provide travel costs for approximately 30 executive reservists expected to attend one or more conferences during the fiscal year, 9 members of the Labor Advisory Committee on Wage Stabilization, and 9 members of the Management Advisory Committee on Wage Stabilization. The estimate provides the following:

1,500 days of travel at $16 per diem	$24,000
Transportation costs	20,000
Mileage costs, parking fees and all other costs	3,485
Total	47,485

Transportation of things, $800

The estimate is based upon past experience and will provide for shipment of printed matter and supplies to field installations.

Rent, communications, and utilities, $22,050

This estimate is based upon past experience and will provide for the following costs:

Rents and utility services	$16,500
Telephone rental and services	5,000
Paid official mail	550
Total	22,050

Printing and reproduction, $4,250

The estimate is based upon program requirements and will provide for the publication of periodic civil defense and mobilization directives, visual aids, reports, handbooks, forms and schedules, internal material, and cost of reproduction services.

Other services, $3,950

The estimate will provide for the following:

CSC security investigations	$2,800
Centralized payroll and accounting	1,000
Miscellaneous contractual services	150
Total	3,950

Supplies and materials, $5,248

The estimate will provide necessary desk-top supplies and services as follows:

Desk-top supplies	$3,000
Central departmental services	2,248
Total	5,248

Equipment, $4,100

This estimate will provide equipment for 10 new positions at a cost of about $300 per position and the cost of replacing equipment not available from surplus stock.

Grants, subsidies, and contributions, $650,000

The estimate will provide grants to 52 State employment security agencies. This will finance approximately 85 man-years of employment at a cost of $527,000, nonlabor $123,000.

Mr. WEISS. The Department of Labor received during this past year something close to $1 million through OCDM, which is now the OEP; $987,348, to be exact. This year we are asking for a total of $1,285,000.

What I would like to speak to is the reason for this increase.

ORGANIZATION OF TASK FORCES

Of that $350,000, $1,285,000 is designed to develop some practical programs in 50 communities; to organize a task force of men, materials, and management, and to have these people prepared for postattack assignments without any warning.

This program is based on some experiments we have been conducting during the past several years. In Allentown, Pa., in Tallahassee, Fla., and in Kalamazoo, Mich., we have had actual experiments in this method of organizing a task force.

In Allentown we have the construction industry organized there so that the workers have all been signed up for civil defense assignments in each of the construction occupations. Management has been or-

ganized and they plan to work together so that if an attack should occur on this country, this entire construction task force will be ready to go into operation instantly. Not only to take care of the people in that community, but also to take care of the thousands of people that community is expected to provide for in the event——

Mr. Evins. Suppose the task force is knocked out; then what do we do?

Mr. Weiss. That, of course, is a hazard, Mr. Chairman. We are selecting for this project communities that we do not believe are target areas. Tallahassee, for example, is not generally considered a target area but it is a support area for several military bases in Florida. It is a support area and recognized by such by local civil defense. They are working out definite plans in that community.

SCOPE OF LABOR ORGANIZATION PROGRAM

Mr. Evins. How long have you been having these studies made?

Mr. Weiss. I would say in the past 2 years we have concentrated on it. We have discussed these with the Department of Defense and with the Office of Emergency Planning, and they agree with us that they have been eminently successful and that we should extend these now to about 50 communities scattered throughout the country.

Mr. Evins. How many communities have you had before the 50 projected?

Mr. Weiss. We have had only three where this has been done.

Mr. Evins. About 8 years you have been in this study.

Mr. Weiss. We have not been very active in this until about 1960. We have had small bits of money for central office planning, but we have not been engaged in field operations.

Mr. Evins. We want to be prepared for any attack, certainly, Mr. Weiss, in all fields. But you have been studying this for about 8 years and you are just doing the same thing over and over again, as I see it.

Mr. Weiss. I cannot agree with you, sir, that we have been doing this for 8 years.

Mr. Evins. Haven't you got all of the reports, studies, and plans that you need?

Mr. Weiss. No, sir, what we are talking about is practical operational organization of the labor force now. Every State in the Union now has a general manpower plan.

PREVIOUS OPERATIONS

Mr. Evins. What did you do before we started doing this, as far as labor is concerned?

Mr. Weiss. As I have tried to say, we started most of our planning in 1960. We have had very little prior to that time.

Mr. Evins. How about prior to that time?

Mr. Weiss. Prior to that time, we did not have very much funds for that kind of planning. We were given very limited funds from time to time to get our national office planning. It was only in 1960 that we received our first substantial appropriation so that we could have in each State a unit in our State Employment Security Agency. We operated through the State Employment Services. During the past

3 years, each State office has developed a manpower plan with the funds we gave them from this appropriation. A substantial part of this money goes to the State and is not used by the Federal Government.

NUMBER OF PERSONNEL

Mr. EVINS. How many people do you have on board at the present time? How many did you have in 1960, 1961, 1962, and how many are requested for 1963?

Mr. WEISS. In fiscal year 1962, approximately 52 positions.

Mr. EVINS. Fiscal year 1961?

Mr. WEISS. Forty-seven.

Mr. EVINS. In fiscal year 1960?

Mr. WEISS. Fifty-one.

Mr. EVINS. Asked for for fiscal year 1963?

Mr. WEISS. Sixty-two positions.

Mr. EVINS. An increase of 10?

Mr. WEISS. That is right.

Mr. EVINS. Thank you, Mr. Weiss, very kindly.

DEPARTMENT OF THE TREASURY

WITNESS

CARL W. CLEWLOW, DEPUTY ADMINISTRATIVE ASSISTANT SECRETARY

Mr. EVINS. Continuing the budget hearings for the delegated agencies with respect to civil defense, we have the Treasury Department, Mr. Carl W. Clewlow, Deputy Administrative Assistant Secretary.

Do you have a statement you want to present? Proceed as you wish, Mr. Secretary.

Mr. CLEWLOW. I have a statement which has been prepared and is available for submission to the committee. Would you care to have me read this?

Mr. EVINS. You may proceed as you wish.

GENERAL STATEMENT

Mr. CLEWLOW. If I may I will submit it for the record and highlight it.

(The statement follows:)

STATEMENT OF CARL W. CLEWLOW, DEPUTY ADMINISTRATIVE ASSISTANT SECRETARY

Mr. Chairman and members of the committee, the budget estimate under consideration includes funds for preparation of national emergency plans and for preparedness programs covering the emergency functions of the Department of the Treasury.

The Secretary is responsible for the development of policies, plans, and procedures for the performance of emergency functions which include (1) emergency stabilization aspects of the monetary, credit, and financial system; (2) emergency collection of revenue; (3) enforcement of emergency banking regulations; (4) supervision of the Federal depository system; (5) direction of transactions in Government securities under emergency conditions; (6) recommendations on tax and debt policies; (7) participation in financial arrangements with foreign governments; (9) regulation of foreign assets in this country and foreign

financial dealings; (9) emergency procedures for the manufacture, issuance, and redemption of coin and currency; (10) emergency systems for the issuance and payment of Treasury checks; (11) maintenance of the Central Government accounting system; (12) emergency administration of customs laws, navigation laws, laws governing import, manufacture, and distribution of narcotics, and laws on control of alcohol, alcoholic beverages, and tobacco; (13) suppressing counterfeiting and forgery of Government securities; (14 protection of the President and Vice President under attack conditions; (15) granting of loans for the expansion of productive capacity for essential materials; and (16) in cooperation with the Department of Defense, provision for port security, search and rescue on the high seas, aids to maritime navigation, and enforcement of various marine inspection laws, as required in an emergency.

On September 15, 1961, the Secretary delegated to the Administrative Assistant Secretary the responsibility to coordinate this program within the Department and to direct the preparation of emergency plans and preparedness programs for the essential emergency functions of the Treasury. In former years, due to the limited funds available, the Office of the Secretary was unable to assume its full responsibilities in this area, and the existing staff members handled as much of this work as they could along with their regular full-time assignments. Recognizing that insufficient funds were available in the current year to discharge properly the functions being transferred, the Office of Emergency Planning agreed to provide the necessary funds to finance the program during the last three quarters of the current fiscal year with the understanding that the Office of the Secretary would request the necessary funds in 1963. A total of $67,363 is being made available by the Office of Emergency Planning. This will finance on a part-year basis eight positions and the cost of equipment, travel, and similar operating expenses. The annual cost of financing the program on the same basis is $99,500. However, it is believed that in 1963 the responsibilities can be discharged with a minimum of six employees, and the estimate for 1963 includes a request for $80,000 for this program.

The funds requested for fiscal year 1963 will provide for the continuation of the necessary staff to render advice and assistance to officials within and outside the Department on matters relating to emergency preparedness: to develop, coordinate, and maintain in a current status emergency plans essential to the continuity of the Department and related Federal agencies; to develop instructions for the guidance of bureaus and offices in developing their emergency plans, implementing documents and procedures; to maintain liaison and participate in planning with the Office of Emergency Planning, the Federal Reserve Board, and other Government agencies on emergency preparedness matters; to maintain continuous activation of the departmental relocation site; to develop programs for training personnel and testing emergency plans consistent with national exercise criteria; and make periodic reviews and appraisals of Treasury's emergency preparedness plans.

EMERGENCY MONETARY ACTIVITIES

Mr. EVINS. Tell us what the Treasury Department is doing in connection with civil defense.

Mr. CLEWLOW. The Treasury Department is concerning itself principally with the development of policies, plans, and procedures for the performance of emergency functions in the several areas of monetary activities. This includes emergency stabilization aspects of the collection of revenue, enforcement of emergency banking regulations, which regulations have been developed; the supervision of the Federal Depository System; direction of some of the transactions of Government securities under emergency conditions; the development of recommendations on tax and debt policies; participation in financial arrangements with foreign governments; regulation of foreign assets in this country and foreign financial dealings; emergency procedures for manufacture, issuance, and redemption of coin and currency. We have systems for the issuance and payment of Treasury checks during an emergency. We have the usual responsibilities that have to do

with the administration of customs, navigation, and tax laws and the protection of the President. These generally are the emergency activities with which our planning is concerned.

Mr. EVINS. Mr. Reporter, place in the record the justification statement on page 112.

(The page referred to follows:)

TREASURY DEPARTMENT

Mobilization planning functions

1962 estimate	$67,363
1963 estimate	80,000
1963/1962 difference	+12,637

Executive orders issued by President Kennedy outlined the emergency preparedness responsibilities of the various Government agencies and provided for the reorganization of the Office of Civil and Defense Mobilization. The responsibilities imposed on the Secretary of the Treasury include the operating functions concerning indirect economic stabilization matters related to monetary, credit, and banking policies. On September 15, 1961, the Secretary delegated to the Administrative Assistant Secretary the responsibility to coordinate this program within the Department and to direct the preparation of national emergency plans and preparedness programs for the essential emergency functions of the Treasury. In former years, due to the limited funds available, the Office of the Secretary was unable to assume its full responsibilities in this area, and the existing staff members handled as much of this work as they could along with their regular full-time assignments. Consequently, it was not given adequate attention. Recognizing that insufficient funds were available in the current year to discharge properly the functions being transferred, the Office of Emergency Planning agreed to provide the necessary funds to finance the program during the last three quarters of the current fiscal year with the understanding that the Office of the Secretary would request the necessary funds in 1963. A total of $67,363 is being made available by the Office of Emergency Planning. This will finance on a part-year basis eight positions and the cost of equipment, travel, and similar operating expenses. The annual cost of financing the program on the same basis is $99,500. However, it is believed that in 1963 the responsibilities can be discharged with a minimum of six employees, and the estimate for 1963 includes a request for $80,000 for this program. The estimated cost of salaries and related personal service costs is $72,000, which is included as an increase over base for this activity. The remainder, of $8,000, is included in the estimate for "General Administrative Services."

Mr. EVINS. I thought you were giving guidance to all the financial institutions about building emergency vaults and that the banks would do many of these things except for the little guidance you may give them.

Mr. CLEWLOW. They seem to be very much interested in our ideas which have been advanced.

Mr. EVINS. Were you doing any work in civil defense activities before?

Mr. THOMAS. They have been doing a beautiful job over the years, and I am sure you do not mind picking up $80,000 this year, do you?

Mr. CLEWLOW. The $80,000 we have budgeted takes care of things which really haven't been done before, Mr. Chairman, and we feel they should be done in a thorough manner—we think the funds should be made available so that Secretary Dillon may discharge his responsibilities.

Mr. THOMAS. Both of you gentlemen are scholars and we are on your side.

Is there anything else, gentlemen?

Mr. EVINS. Thank you very much, gentlemen.

FEDERAL COMMUNICATIONS COMMISSION

WITNESS

RICHARD S. SOLAN, ASSISTANT EXECUTIVE OFFICER, FEDERAL COMMUNICATIONS COMMISSION

Mr. EVINS. Continuing with our hearings on civil defense with respect to delegated agencies we have next the Federal Communications Commission and Mr. Richard Solan, assistant executive officer.

Mr. Reporter, place in the record page 20.

(The page referred to follows:)

FEDERAL COMMUNICATIONS COMMISSION

Defense coordination

1961 actual	$15,292
1962 estimate	15,300
1963 estimate	67,509
1963/1962 difference	+52,209

In FCC, the Defense Coordination Division assures the continuity of FCC effort in emergency planning and mobilization of FCC personnel and facilities; it coordinates the activities of the Commission's damage assessment officer at the OEP classified location and the work of the broadcast bureaus defense activities officer with NREC and it selects and trains FCC executive reservists. The 1963 estimate covers the cost of these activities.

The 1962 estimate covers only the cost of FCC representation to the National Resources Evaluation Center.

EXPLANATION OF JUSTIFICATION

Mr. EVINS. Mr. Solan, tell us what you want to do or plan to do for civil defense in the Federal Communications Commission.

Mr. SOLAN. First, with respect to page 20 I want to make one thing clear: The way it is set up on this sheet it implies that we are asking for an increase of $52,000. That is not correct. Last year in our own budget we absorbed our own defense activities. That is our emergency relocation site, and all the planning that goes along with it.

The only thing we were reimbursed for was the one man we had at NREC, which is a $15,300 item. So the $67,000 as it appears here makes it look like we are asking for an increase, whereas we are not asking for an increase at all in this amount.

Mr. EVINS. The FCC is a very important Commission and you have a substantial budget and you can do a little defense coordination without any increased funds; can you not? You can absorb the request?

Mr. SOLAN. We are not asking for any increased funds.

Mr. EVINS. Very well. We will get along just beautifully.

Mr. HARPER. Mr. Chairman, I would like to take some responsibility on that. This is the amount we gave the Agency last year at the time of the delegation. The OEP share only. Fifteen thousand dollars is OEP share only.

Mr. EVINS. Thank you, Mr. Solan, very much.

SMALL BUSINESS ADMINISTRATION

WITNESSES

PAUL S. HOWELL, BUDGET OFFICER
LLOYD R. STEWART, CIVIL DEFENSE PLANS OFFICER

Mr. EVINS. Continuing our appropriations hearings for the delegated agencies with respect to Civil Defense we have with us from the Small Business Administration, Mr. Paul S. Howell, the budget officer.

JUSTIFICATION OF THE ESTIMATE

Mr. Reporter, place in the record page 113 of the justification which shows for 1961 you have for civil defense activities $15,839; for 1962, $16,200 and for 1963, you are asking for $42,000 or an increase of $25,800 for civil defense.

SMALL BUSINESS ADMINISTRATION

Civil defense and defense mobilization activities

1961 actual	$15,839
1962 estimate	16,200
1963 estimate	42,000
1963/1962 difference	+25,800

Washington staff (three positions)

The SBA has the responsibility for developing plans for adapting its program to emergency conditions. By Executive order, the administrator has been delegated responsibility to provide programs to insure the continuity of the agency to continue in an emergency its functions immediately essential to the survival of SBA and its employees; to provide additional essential functions as dictated by an emergency situation; to support the national defense program and to resume normal functions that were suspended during an emergency.

The Emergency Planning Office has initiated several programs under these delegations to SBA. The funds herein requested are needed for the expansion of the program already developed and the initiation of additional programs. SBA's projected civil defense and defense mobilization program is predicated upon the need to develop as soon as possible an acceptable capability both at the national and field levels, to meet survival and operational problems under emergency conditions. The overall program, therefore, gives its greatest emphasis to preattack planning and training for postattack situations.

NREC staff (one professional and one secretary)

This staff provides technical direction and coordination to OEP and SBA Washington and field offices in connection with the facility inventory of small plants.

In addition to the cataloging of these small plants with the information being furnished to the NREC, an inventory of SBA production facilities is maintained on a decentralized basis in each of the SBA field offices.

ADDITIONAL EMPLOYMENT

Mr. EVINS. Tell us what you want to do, what you are planning to do, and why is it necessary.

Mr. HOWELL. This is Mr. Stewart, who is in charge of the operation.

Mr. STEWART. I would like to refer back to 1961. There, Small Business financed in our own budget the three positions. We are asking for a total of five now in this program.

In 1962 we had to absorb one—OCDM had one that is being transferred to us in the 1963 budget. We now are asking for one more

employee, making a total of five for the 1963 budget. The reason we are asking for one additional is because of the increased emphasis on the program and the particular part that Small Business Administration expects to play in the civil defense area.

Mr. EVINS. I can understand why our cities, utilities, and defense installations and everybody is interested in civil defense but just what does the Small Business Administration do in the civil defense field other than just providing bulletins for its own personnel to go to the shelter in case of an alert?

Mr. STEWART. Quite a bit.

CIVIL DEFENSE FUNCTIONS OF SBA

The first job that we have in Small Business is to make plans to assure continuity of the agency. That has already been given to us by an Executive order. We have been doing that.

Mr. BOLAND. You are familiar with the continuity. You do not need any money for this now?

Mr. STEWART. No. We have been doing that and we expect to continue. Then, under the proposed Executive order we intend to extend this into the small business segment of industry, in the field. The local program is being reemphasized and strengthened in our regions which heretofore we haven't been able to touch.

Mr. EVINS. You have a supplemental budget request, I think, of about $90 million before this committee, or one of the committees. Can't you absorb the civil defense activities?

Mr. HOWELL. The $80 million is only for loans. There is no administrative money in that amount.

Mr. BOLAND. The revolving fund for small business loans?

Mr. HOWELL. Yes, including disaster and investment and development company loans.

In our regular budget we are now financing three people for this type of work. OEP is financing one. That is the $16,200. In 1963 we propose to move this one person from OEP rolls to our rolls, which will make four. Also, funds for one more employer are being requested for OEP work in the SBA budget.

Mr. EVINS. Where will they be, Mr. Howell?

Mr. HOWELL. Two at the OEP site and three in the Washington office.

Mr. EVINS. What do you mean by site?

Mr. STEWART. The classified site. Incidentally, that person wears two hats. We would like to have another one there, too, because he spends half his time at NREC.

Mr. EVINS. I am one of the great friends of the Small Business Administration and I think it is a very important agency. I think it ought to have adequate funds to operate. Their loans are paid back and they assist small business in many ways but I do not think you have too much activity in civil defense. I just cannot quite get that aspect of your functions in my mind.

Mr. STEWART. Well, we do not know——

Mr. EVINS. We all have a natural instinct of survival, but you haven't told me just exactly what Small Business does in civil defense.

STRENGTHENING OF FIELD STRUCTURES

Mr. STEWART. Well, we hope to be able to carry defense planning to industry and help by counseling them. That is supposed to be, in SBA's new executive order. It has not come out as yet.

We have a financial responsibility in the economic stabilization field, too, and we think we will eventually support Treasury, through the use of our field organization. What we want to do, looking in advance, is to strengthen our field structure now in case that comes about. As an example, in the last 6 months we have been going to the field, conducting training conferences in readiness planning. We leave next week for region VII in Chicago, to further this strengthening. At the present time we have little, if any, foundation there to build on. So we are trying to assist them by visiting the field.

Mr. BOLAND. What are you going to build? You want to go to the field to build. To build what? Is this Administration giving advice, counsel, and guidance to small business?

Mr. STEWART. That is right.

Mr. BOLAND. This is what you are going to do, or what you are doing now?

Mr. STEWART. What we plan to do—with regard to a personnel shelter, for instance, and continuity of their own organization, their corporate organization—is to stimulate disaster preparedness in order to minimize the effect of an attack—to assure continuity of a production capacity.

Mr. BOLAND. What can Small Business tell them with respect to continuity? Yours is only financial advice, isn't it?

Mr. STEWART. We are talking about civil defense. We are going out and say, "Now look"——

PHYSICAL SURVIVAL

Mr. BOLAND. You are going to tell small business how to survive?

Mr. STEWART. Yes; that is right—to advise them.

You would be surprised how many people don't know the minimum essentials of survival.

Mr. BOLAND. I understand that but I thought this was the job of the local community to do this. I do not know why the Small Business Administration—why we should be paying money to regional offices or your field offices for the purpose of telling small business how to survive, when the local communities have their own civil defense setup and I presume they tell them. They have leaflets and booklets which indicate to them how to survive. We are talking about the physical survival, I presume, now. Is this what you are talking about now, the physical survival?

Mr. STEWART. Yes, and corporate survival also.

Mr. BOLAND. Don't they get this information from the local civil defense authorities?

Mr. STEWART. I should think they could.

Mr. BOLAND. Then what does Small Business want to get into it for? I can understand your man at NREC, but I cannot understand Small Business or your administration going out to the local areas and saying, "This is how you survive, this is how to take care of the effects

of radiation or fallout." I understand this is what you intend to tell them.

Mr. STEWART. That is just one aspect of it. We have other responsibilities in the post-attack period too.

Mr. BOLAND. This is an aspect they could easily get from the local civil defense authorities. We are spending millions in this area. They want us to spend millions and hundreds of millions more this year. I do not know why your organization should want to get into the field of advice to small business on how to survive physically in an area that has been attacked. This is a job for local civil defense authorities.

Mr. STEWART. Well, we have cases where they have come to us asking about it. We are supposed to be the spokesmen and counsel for the small businessman.

Mr. BOLAND. Send them to the civil defense authorities in the town or community. I would think this is what you would do. This is not your business. This would be complete duplication. You are telling them how to survive, how to get away from fallout, how to treat for shock and all this sort of thing, and this is exactly what the civil defense authorities are supposed to do in all the areas in the United States. This is not the job for the Small Business Administration.

FUNCTIONS AS PRIME DEFENSE CONTRACTOR

Mr. RICE. I believe in the Executive order coming out there is also another function contemplated for the Small Business Administration. This is to prepare to develop a plan for serving as prime contractor to small businesses, in defense contracts, in the postattack situation. Am I right, Mr. Thompson, about that?

Mr. THOMPSON. Yes.

Mr. RICE. This is a brandnew function.

Mr. EVINS. It is indicative of the fairness and completeness in which civil defense is going to be permeated into our whole system of business.

Mr. EVINS. Thank you, gentlemen, very much.

Mr. THOMPSON. Mr. Chairman, before you adjourn could we get your guidance on one thing? I notice all the way through the testimony here this year and in previous years you have asked the Agency why they could not absorb. Then in your comments usually you have said, "You should absorb."

Now, their problem is the definition of "absorb." Some of them think of this as including it in their budget. Some of them think it is——

Mr. THOMAS. I cannot answer the question. The committee has not gotten together on it yet.

Mr. THOMPSON. I did not understand.

Mr. THOMAS. I cannot answer the question. The committee group will have to meet and try to work out something.

Mr. THOMPSON. This is a procedural problem and it is aggravated by the fact that Mr. Fogarty has consistently said in effect, "Don't let me catch you spending any of your regular funds on this subject."

Mr. THOMAS. We will give you specific instructions in the report so you will have no trouble. We will arrange that as we did with HEW.

Thank you very much.

MONDAY, APRIL 16, 1962.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WITNESSES

JAMES E. WEBB, ADMINISTRATOR
DR. HUGH L. DRYDEN, DEPUTY ADMINISTRATOR
DR. ROBERT C. SEAMANS, JR., ASSOCIATE ADMINISTRATOR
THOMAS F. DIXON, DEPUTY ASSOCIATE ADMINISTRATOR
D. BRAINERD HOLMES, DIRECTOR, OFFICE OF MANNED SPACE FLIGHT
DR. HOMER E. NEWELL, DIRECTOR, OFFICE OF SPACE SCIENCES
MORTON STOLLER, DIRECTOR, OFFICE OF APPLICATIONS
EDMOND C. BUCKLEY, DIRECTOR, OFFICE OF TRACKING AND DATA ACQUISITION
DR. WERNHER VON BRAUN, DIRECTOR, GEORGE C. MARSHALL SPACE FLIGHT CENTER
DR. ABE SILVERSTEIN, DIRECTOR, LEWIS RESEARCH CENTER
D. D. WYATT, DIRECTOR, OFFICE OF PROGRAMS
PAUL G. DEMBLING, DIRECTOR, OFFICE OF LEGISLATIVE AFFAIRS
ALBERT F. SIEPERT, DIRECTOR, OFFICE OF ADMINISTRATION
RALPH E. ULMER, DIRECTOR OF FACILITIES COORDINATION, OFFICE OF PROGRAMS
BOYD C. MYERS II, DIRECTOR OF PROGRAM REVIEW AND RESOURCES MANAGEMENT, OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY
MILTON B. AMES, DIRECTOR OF SPACE VEHICLES, OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY
HAROLD B. FINGER, DIRECTOR OF NUCLEAR SYSTEMS, OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY
E. M. CORTRIGHT, DEPUTY DIRECTOR, OFFICE OF SPACE SCIENCES
DAVID WILLIAMSON, JR., CHIEF, PROGRAM COORDINATION, OFFICE OF TRACKING AND DATA ACQUISITION
WILLIAM E. LILLY, DIRECTOR OF PROGRAM REVIEW AND RESOURCES MANAGEMENT, OFFICE OF MANNED SPACE FLIGHT
MORRIS TEPPER, DIRECTOR OF METEOROLOGICAL SYSTEMS, OFFICE OF APPLICATIONS
LEONARD JAFFE, DIRECTOR OF COMMUNICATIONS SYSTEMS, OFFICE OF APPLICATIONS
DR. HERMAN H. KURZWEG, DIRECTOR OF RESEARCH, OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY
DR. ALBERT J. KELLEY, DIRECTOR OF ELECTRONICS AND CONTROL, OFFICE OF ADVANCED RESEARCH AND TECHNOLOGY
RODOLFO A. DIAZ, ASSISTANT DIRECTOR, FACILITIES, PROGRAM REVIEW AND RESOURCES MANAGEMENT, OFFICE OF MANNED SPACE FLIGHT

Mr. THOMAS. The committee will please come to order.

We have with us this morning the National Aeronautics and Space Administration.

INTRODUCTION OF WITNESSES

We have quite a distinguished list of guests here. It is certainly nice to see our distinguished friend and administrator, Mr. Webb.

He has a very able staff composed of Dr. Seamans, Associate Administrator; Mr. Dixon, the Deputy Associate Administrator.

Where is Mr. Dixon? What is Mr. Dixon's job?

Dr. SEAMANS. He has two functions right now. He is my deputy, particularly concerned with institutional matters relating to our centers, and he is also Acting Director of the Office of Advanced Research and Technology. The post was formerly filled by Mr. Abbott. He has left us. We are in the process of hiring somebody to take his position.

Mr. THOMAS. What became of Dr. Abbott? He is well and favorably known to the committee.

Dr. SEAMANS. He had been working ably with the NACA and then in NASA for some 30-odd years, as you know. He reached the point where his doctors were concerned about the load he was carrying.

Mr. THOMAS. How old is he?

Dr. SEAMANS. I guess around 55. I believe he is still living in the Washington area, and is now consulting with several companies.

Mr. AMES. Mr. Abbott is still living in Washington. He will be leaving the 1st of May to go to New Hampshire where he intends to make his home.

Mr. THOMAS. How old is the doctor?

Mr. AMES. Fifty-five, sir.

Mr. THOMAS. I noticed he lost a lot of weight.

Mr. AMES. Yes. He worried about keeping pace in advance research and technology. He worked very hard. The doctors told him he should not handle a supervisory role.

Mr. THOMAS. You convey the committee's best wishes to him. We always enjoyed having him. A lot of times he would give us a lecture, and I guess we were overdue on that lecture.

What is Mr. Dixon's background?

Mr. WEBB. Mr. Chairman, Mr. Dixon was for 16 years with the North American Aviation Co., the Rocketdyne Division. He is one of the two men credited with having developed the high-powered liquid fuel rocket engines up to the 1-million-pound-thrust engine. He was the administrator of a very large area of operations involving between 20,000 and 30,000 people. He was vice president of that company at the time he was willing to give up all the salary, prerogatives, and emoluments of that high position and join the Government because he felt this Government was so important.

Mr. THOMAS. You are very fortunate to get him.

Where did you go to school, Mr. Dixon?

Mr. DIXON. I went to Vanderbilt University.

Mr. EVINS. That is a great university.

Mr. DIXON. The University of Michigan and California Institute of Technology.

Mr. THOMAS. Congratulations. You are welcome aboard. We are delighted and honored to have you.

Mr. WEBB. He comes from a part of the country that was once North Carolina-Tennessee.

Mr. THOMAS. Here is Dr. Newell with us again. We are certainly delighted to have the doctor back. He is one of our Russian specialists, is he not?

We have Mr. Tepper here, Director of Meteorological Systems, Office of Applications; Dr. Jaffe, Director of the Communications Systems; Mr. Buckley, Director, Office of Tracking and Data Acquisition.

Where is Mr. Buckley? A man spending as much money as you are should not be at the end of the table. You should be next to Mr. Webb.

Have you seen what Mr. Buckley is doing this year?

Mr. OSTERTAG. He has a rather ambitious program.

Mr. THOMAS. We are delighted to have you, Mr. Buckley. If this crowd says something you do not like, you come right back at them.

Where is Mr. Wyatt? We are going to promote you. Mr. Wyatt is an oldtimer with us. We are glad to have you.

Mr. Dembling, Director, Office of Legislative Affairs. He writes more letters.

Mr. OSTERTAG. Off the record.

(Off the record.)

Mr. THOMAS. Mr. Siepert, Director, Office of Administration; Mr. Ulmer, Director of Facilities Coordination. He has been around for years.

We are delighted to have all of you.

Mr. Myers, Director of Program Review and Resources Management, Office of Advance Research and Technology.

Mr. Ames, Director of Space Vehicles, Office of Advance Research and Technology.

It is good to see you, Mr. Ames. It is nice to have you.

You and Dr. Holmes work hand in glove?

Mr. AMES. I am not sure that he knows it, but I have a lot of contact with the staff.

Dr. SEAMANS. He reports in to Mr. Dixon, which is a separate office from Manned Space Flight.

Mr. THOMAS. So he reports to Mr. Dixon?

Dr. SEAMANS. That is right.

Mr. THOMAS. Mr. Finger, Director of Nuclear Systems, Office of Advance Research and Technology.

Where are you from Mr. Finger?

Mr. FINGER. New York City originally.

Mr. THOMAS. Tell us about yourself. What did you do before you came here?

Mr. FINGER. I left New York City in 1944 and went directly to the NACA in Cleveland, Ohio, at the Lewis Research Center.

Mr. THOMAS. How long were you there?

Mr. FINGER. Until NASA was formed in 1958, 14 years.

Mr. THOMAS. That is remarkable. You look quite young yet.

Mr. FINGER. Thank you.

Mr. THOMAS. You are one of these good dedicated scientists.

Mr. WEBB. I think you would be interested in recalling that Mr. Finger runs a joint office with the AEC. In order to run this most efficiently, the funds we use for nuclear work, and the funds they have for space nuclear work, are merged in one office, which Mr. Finger

runs. He is from NASA. There is a deputy from AEC, and we have found this is a most satisfactory way to get the most for the money.

Mr. THOMAS. I am sorry you brought that up. Off the record.

(Off the record.)

Mr. THOMAS. The doctor says Plumbrook will be going this summer. We have heard that for 6 years now. It will be going in full force and effect?

Mr. MYERS. It will be going to full power this summer.

Mr. THOMAS. How much money do you have tied up in it today?

Mr. MYERS. $15 million.

Mr. THOMAS. Are you sure?

Mr. MYERS. No, sir. I better check on that.

Dr. SEAMANS. Dr. Silverstein was on the telephone and said he would be delighted to be here with you tomorrow. He can discuss this in any detail you want.

Mr. THOMAS. There is no question about that. And he will sell you on another.

Mr. Cortright, Deputy Director, Office of Space Sciences. You ought to be a doctor. Can you not promote him, Mr. Webb?

Mr. WEBB. Unfortunately, universities only give those degrees.

Mr. THOMAS. We are delighted to have you. Welcome aboard.

Mr. Williamson, Program Coordination, Office of Tracking and Data Acquisition, and Mr. Lilly, Director of Program Review and Resources Management.

It is nice to have you with us.

(Off the record.)

Mr. THOMAS. We are certainly delighted to have all of you. Talk as long as you like.

We like to discuss your problems. I hope all of you will feel free and at ease and say what you want to. We are delighted to have you.

GENERAL STATEMENT

Mr. WEBB. Thank you, Mr. Chairman. I do have a brief statement. Before reading it, I would like very much to simply say that the point you have raised about Mr. Dixon's responsibility shows the strength we are building into the management of this large program.

When Dr. Abbott found by doctor's advice he was unable to continue as one of our four major program managers, the fact Mr. Dixon was willing to join this agency and give us the long experience he has had in the rocket area meant we were able to assign him this additional duty. The work he does with Dr. Seamans is directly related to all of our centers. He has spent a great deal of time in the field with our center managers, but also is concerned with these advance research tools that——

Mr. THOMAS. You are lucky to get him.

Mr. WEBB. Yes.

The point I wanted to make, when Dr. Abbott was unable to continue, we had a man as Dr. Seamans' deputy who was able to carry this additional load.

We have under negotiation now the filling of this vacancy with one of the most distinguished men in the Nation. I think within 2 weeks we will have those negotiations completed so we will then have Dr.

Newell in charge of our space sciences, Mr. Holmes in charge of manned flight, Mr. Stoller, who is ill today, and this new man. This means Mr. Dixon will return full time to his job as deputy to Dr. Seamans.

The quality of the men we have in these four programs manager jobs is, I think, a great credit to the country.

Mr. THOMAS. You have some great scientific minds.

You have these gentlemen like Dr. Seamans and Mr. Holmes and Mr. Dixon, who have had some practical everyday experience, and you cannot beat that combination.

Mr. WEBB. That is right.

The two major programs here that are involved in this are headed by men from industry, Mr. Holmes and Mr. Dixon.

Let me say one other thing. We have based the requests this year, which I will refer to in a moment, on the program which we expect to carry out insofar as it can be forecast with the present state of the knowledge.

However, we have inserted into the management of these programs three important tools that permit us to change.

EXTENDED WEIGHTLESS FLIGHT

The first of these is an experimental flight program with the GEMINI flying on a TITAN. The TITAN is, by all the information we have now, a very promising space booster. It has taken advantage of much that we have learned from the earlier boosters. It has sufficient power to fly the GEMINI, and by using this interim spacecraft flying on an already developed booster, we will learn a great deal about the possibilities for extended weightless flight by man.

If we find that men can live, say 3 days, and return safely to Earth, but not 4 or 5 days, we will be able to modify the advanced, more expensive programs for the APOLLO and the advanced SATURN and the NOVA.

If, on the other hand, as we expect, we can by development increase the time that men can live and work effectively under weightless conditions, we can then speed up the programs and move on to the accomplishment of our goals of not letting the Russians, or any other nation, develop a technology more advanced than our own.

RENDEZVOUS OF SPACECRAFT

The second benefit of this interim flight program is that we will be testing the rendezvous technique, using the pilots in the GEMINI spacecraft to effect the closure and joining of two spacecraft in orbit at some 18,000 miles an hour.

Now, we have made quite complete calculations in our studies, and believe this kind of technique is available. But if we waited until about 1965, or so, to try it with two SATURNS——

Mr. THOMAS. Off the record.

(Off the record.)

Mr. WEBB. The point of the GEMINI, I think, is, it is using men to control the spacecraft in the final stages of closure and joining, which we think is the most efficient and effective way to do this. If

it turns out this technique is possible, either the joining of a fully fueled engine with the section containing the men, or by sending up a vehicle that is complete in itself except for fueling, and transferring the fuel from a tanker into this machine, if either one of those techniques is possible, then we will save about 2 years in our program of lunar exploration, and we will have a solid basis of practical flight experience, using this technique on which to project the future plans for all of our space work.

Mr. THOMAS. You are going to save time and what else?

Mr. WEBB. Money.

But, more importantly, this technique is of great significance, not only in the civilian program but in the military program because if you can join two spacecraft, once you know the orbit of the first one, or target, you also can go up and inspect the other fellow's, so the technique by which we are working here, using men, will be of great significance for the advance of military technology.

May I say in that connection that the NASA program now before this committee is the only program the United States has for building these large spacecraft boosters, and for developing these kinds of techniques using men. There are other programs projected. Some of them have had studies. Some are in the preliminary stages, but the only ones that have come now by recommendation of the President before the Congress are in this program.

PROGRAM FLEXIBILITY

The third point I would like to make, beyond the fact that we have this experimental flight program to test the theory, to test the concepts, is, we have at the same time developed this governor on the machine that gives us knowledge and gives us assurance that the money we spend will give us our money's worth, we have perfected—I say perfected—we have started and built the foundation for a business management system that permits us to either speed up, or slow down, the contracts.

This is more than just simply issuing an order to a contractor. It means you have to have a thorough knowledge of exactly which contracts need to be speeded up or slowed down and exactly where the bottlenecks in the program are going to come, whether in the development of the ground facilities, or in the flight hardware.

So I think the foundation for the consideration of these recommendations by the President rest in the business management system in the fact while we have projected plans that utilize and put forward those things this Nation needs to do, based on the latest state of the art, at the same time we are constantly testing them through actual flight operations based on our experience with the X–15 plane.

SHARING OF SPACE KNOWLEDGE WITH OTHER COUNTRIES

Mr. OSTERTAG. May I inquire of Mr. Webb about this whole area of sharing our space knowledge.

Not too long ago it was advocated that we negotiate for broad sharing of space exploration and scientific developments, and a moment ago you made reference to the fact that certain of these developments have great military significance.

I wish you would devote a moment to this broad aspect and problem of how far we can go or might go in regard to sharing, and where the military might be associated in relation to our security and the area that we cannot afford to share.

Mr. WEBB. All right, sir.

Mr. Ostertag, I think the point on which to start is the fact that, following the war, we had a great debate in this country as to whether atomic energy should be developed by the military services, or a civilian commission. It was decided to have a civilian commission.

This commission was to be a contractor to the other services. Its work was to be highly classified. It was to have custody of all initial materials and own the patents and other rights and know-how with respect to operations. There was a provision that this civilian agency would, through isotopes, through commercial power, through any other means available to it, try to get out of the program those things that would contribute to the general good of the country.

I think this is one of the main reasons that the form of organization turned out to be a civilian commission.

Following that in 1950, as your committee so well knows, the Nation embarked, through the National Science Foundation, on a program of general support of science and technology, most of it unclassified, and I believe partly because it was determined that the universities could be better brought into a picture that was not completely dominated by military developments, but where basic research was the main objective to be attained.

Now, following the creation of the National Science Foundation, it became clear in the early fifties that rockets could have the power for intercontinental delivery of bombs, that this new rocket engine with this capability of carrying its oxygen as well as its fuel, able to deliver its power out beyond the earth's atmosphere as well as in the earth's atmosphere, opened up a whole new range of possibilities not heretofore available to mankind. Man had been looking with balloons, engines that were air-breathing engines, with smaller rockets that had been developed for World War II, and based on the V–2 experience, it carried a good many instruments above the earth's atmosphere. But here was a radically new type of engine that permitted man to go up beyond the earth's atmosphere, study the law of nature, and this would open up great possibilities.

Even before the 1958 act, which was the further development of this series of events, beginning with the Atomic Energy Commission, and really growing out of the large scale organized efforts in science and technology during the war, even before that, there were suggestions that you might have a microwave relay station in the sky in the form of a satellite, that you might have weather observation satellites. As the thought developed to use this new device that could deliver its power beyond the earth's atmosphere, and since it was not dependent on the atmosphere for either oxygen or a working fuel, many concepts came forward.

There was much discussion, and again there was discussion of the military value, and of civilian value, how it could contribute to the economy, and after a great deal of debate, the 1958 act creating the National Aeronautics and Space Administration was passed. At that time it was hoped there would be a way to avoid having space become

the next new arena for military operations. There was great hopefulness in Congress and the Nation that somehow, through cooperation with other nations, we would find a way to at least deemphasize the unilateral development of space capability for destruction and maximize those areas in which it might become a foundation for even a broader cooperation among the nations, including the Iron Curtain countries as well as the free nations.

Proposals were made to the U.N. along this line by President Eisenhower. The U.N. established a Committee on the Peaceful Uses of Outer Space. The scientists themselves in their international organizations which are nongovernmental began to work in this direction.

Now, it would take a long time to cover all the developments over the last 4 years, but I think it is fair to say we are at this time, and in connection with this budget, in a situation in which we are still seeking a means of international cooperation.

As suggested by President Kennedy in the recent exchange with Premier Khrushchev, we are exploring how serious the Russians are about the possibility of cooperation in space exploration through the discussions that Dr. Dryden is heading.

Now, I believe it is fair to say that the President's view—certainly it is my own view—is that while we will pursue these activities to whatever extent the interests of this Nation permits or requires, we will at the same time keep our powder dry.

As we develop this science and technology, we will conduct it under the 1958 act insofar as this policy appears to continue to serve the interests of the Nation. The act does require a very open program with classification only for those that do have a military implication, either where we adopt military technology, or where we develop a capability for military technology which is of primary interest to the military services.

Mr. Ostertag. Is it possible to divide certain developments that may ultimately have military importance or significance? Can you draw a dividing line? Can you define it?

Mr. Webb. I do not think it is possible to draw a precise line, but I think it is possible to so conduct the military program and the civilian program in coordination with each other that we minimize the risk and maximize the benefits for military purposes.

I think to set down a precise formula in the beginning would be self-defeating because we are in such a rapid area of development and because I think the events of the last, let us say, year do indicate there is still some possibility for the beginnings of cooperation, even with the Russians, that may open a small area of cooperation that might possibly be enlarged.

I would like to point out it is not only cooperation with the Russians that is important here, but one of the most interesting parts of this budget the chairman has already referred to in his concern about the substantial sums going into tracking and data acquisition.

We have created in this program a worldwide network for tracking and data acquisition which is a very great asset, and which no other nation has. This permits us to develop what Lloyd Berkner calls technological dexterity in all these fields by a method that permits us to move fast, to perhaps protect our national security position by very rapid movement rather than by an endeavor to classify everything that might potentially have a military value.

NATURE OF INTERNATIONAL COOPERATION

What I am really saying here is, in this international cooperation which at the moment does not include Russia except for some very minor matters, we do have the cooperation of between 50 and 60 nations. We do have some nations like England and Canada cooperating by building complete satellites that accomplish purposes that we would need to do if they did not do them. All of this is done without exchange of dollars.

Each nation that wishes to cooperate in this program must meet two tests—its scientists must want to do the work and come forward with proposals that expand the whole area of knowledge and fill in a gap, or we will not allocate the boosters to fly the experiment, and the Government must back it up by putting the money in it to pay for the work it does itself, and the foreign scientisis must then agree to go forward with the analysis of the data and its publication.

So we do have a very substantial area of cooperation, and many of these stations which are available now for the civilian program, in many cases the nationals of these nations man the stations and they regard this as their entering wedge to modern technology in many fields.

This is a nucleus of people trained in modern science and technology that can be enlarged for them, this is an important international objective of the country.

Before you came in, I said to the chairman that the Secretary of State last Wednesday took me aside after a meeting in the State Department and said the space program was opening up possibilities for some effective use in our foreign affairs program that were far beyond his previous expectations. He wanted to have further conversations about this and personally understand the program thoroughly.

Dr. Dryden and I are going to see him tomorrow afternoon for this purpose.

POTENTIAL AREAS OF COOPERATION

I think you must recognize here that cooperation extends beyond that area we talk about with the Russians.

Specifically with respect to this, there are certain areas where their scientists and ours might cooperate. Their Government might cooperate with our Government in ways that would not give away any kind of military technology. If they should launch, let us say, a weather satellite and we should launch one in a different orbit, we would not have to see their launching, or know what kind of booster they use; neither would they ours.

We would not have to see the satellite with the equipment in it, or would they ours, though ours has been pretty well published throughout the world as a result of the 1958 law. By and large, the problems that would exacerbate the relationships among the nations would be minimized, and the possibilities for benefiting would be maximized through such a type of arrangement. Where that would lead from here on out, I have no way of knowing. But the President's policy is to pursue it and see where it leads.

Let me mention one other field.

In the tracking of these satellites and the obtaining of data from them, there are certain gaps in the worldwide network. If there were

tracking and data acquisition stations in Russia which they would man, using our equipment and, vice versa, which we would man using their equipment, we would both benefit very, very materially.

I mention one other very brief area, the plotting of the magnetic fields around the earth using scientific satellites is one of the most important scientific endeavors. It cannot be done completely by either of us because the measurements from the satellites must be coordinated with measurements on the ground and in certain other relationships.

Now, there are a number of things like this we can do in a hard-headed way without giving away anything that we now have exclusively, and possibly opening up areas that might prevent this from becoming an arena of warfare.

Let me touch on that.

INTERNATIONAL TRACKING SITES

Mr. BOLAND. With respect to cooperation by other nations, in the areas where we have tracking stations, I presume we have acquired a lot of land. Have we acquired it by purchase or was it given to us?

Mr. WEBB. I think the relationships differ in most of these countries.

Mr. BOLAND. I know. You are talking about the cooperation of all the nations who are in this field. It would be nice to find out exactly what the cooperation is with respect to this area here. It is a small area, but important.

Mr. BUCKLEY. In all cases, except possibly one, the country where we have the station has given us the land, or allowed us to use it.

In general, they have appropriated the land in their own country, and then assigned it to us. This is one of their contributions to our station. They take a lot of pride in the fact they have assigned the land to us. I think this is almost universal.

COOPERATION WITH ENGLAND AND CANADA

Mr. BOLAND. Also, in line with what you were talking about with respect to the effort that England and Canada are putting into this field, what type of satellites are they building that we will not build, or have not built?

Dr. NEWELL. In the case of the Canadian satellite, the Canadians are building an ionospheric top-side sounder. By that, we mean that they are building a satellite to investigate the ionosphere from above in the manner in which we normally do it from the ground, from below.

The Canadians are building this entire satellite and paying for it themselves. They are installing a ground station in their own country, and we are installing ground stations in our country. The United Kingdom is installing ground stations they will use to observe this satellite. Thereby, you see, we are able to accomplish part of our ionospheric research without having to pay the rather sizable sums for the satellite. The Canadians are paying for it themselves.

In the case of the United Kingdom satellite, the United Kingdom is preparing instrumentation to make a different type of investigation of the ionosphere where they will measure the kind of particles

that are there, and to measure the solar radiations that produce the ionosphere.

Here again they are paying for their instrumentation, but in this case they are not paying for the entire satellite. We are building a structure that will carry the instruments. But again, you see, we are getting these experiments done by the United Kingdom so we do not have to do them ourselves.

NATURE OF CANADIAN RESEARCH COOPERATION

Mr. JONAS. Where is Canada building this satellite?

Mr. WEBB. This is being built by the establishments of the Defense Research Board.

Mr. JONAS. In Canada?

Mr. WEBB. In Canada.

Mr. JONAS. What is their program costing?

Dr. NEWELL. I do not have the exact figure.

Mr. JONAS. Did they start from scratch?

Dr. NEWELL. They started on the basis of past experience with rocketry, but they had no previous experience in satellite work.

Mr. JONAS. How much do they draw on our technology and knowledge and background?

Dr. NEWELL. They draw on our technology and knowledge through consultation with the Goddard Space Flight Center.

Mr. JONAS. But not to any other extent? They are building it themselves, without any help from us, are they not?

Dr. NEWELL. They are building it themselves.

Mr. JONAS. All we have contributed is conversation.

Dr. NEWELL. Consultation, yes, sir.

Mr. JONAS. We have not furnished them any blueprints or drawings or technical assistance or supervision or anything else?

Dr. NEWELL. We provide the technical assistance in the following way. As soon as the project is undertaken, a working group is formed which is chaired by a man from the Goddard Space Flight Center and which has on it scientists and engineers from NASA and scientists and engineers from the Defense Research Board. In this program we have had them down to our laboratory at the Goddard Space Flight Center, and we have also had them at the Wallops Island facility. We have assisted them with rocket sounding launchings to test out their equipment.

LAUNCHING OF BRITISH AND CANADIAN SATELLITES

Mr. JONAS. I would be interested to know a little more about their satellite. What kind of booster are they using?

Dr. NEWELL. We will launch the satellite with a THOR–AGENA booster. That is our part of the cooperation.

Mr. JONAS. From what point?

Dr. NEWELL. From the Pacific Missile Range.

Mr. JONAS. You mean they will transport their satellite from Canada to California?

Dr. NEWELL. That is correct.

Mr. JONAS. What is its size?

Dr. NEWELL. It is several hundred pounds. I do not know the exact dimensions offhand. It is in the 300- to 400-pound range.

Mr. JONAS. If the information is available without doing any research, I would be interested to know what it is costing them to construct it.

Mr. THOMAS. Did I understand him to say we are furnishing the booster?

Mr. JONAS. We are going to launch it. Are we furnishing the booster?

Dr. NEWELL. We are furnishing the booster.

Mr. JONAS. That is the biggest cost, is it not?

Dr. NEWELL. In this case it is, yes.

Mr. JONAS. Will the British bring their satellite over here for launching?

Dr. NEWELL. Yes. In fact, it is here.

Mr. JONAS. They will not construct any booster, then.

Dr. NEWELL. Not for this launching, but the British are considering the possibility of developing a launching capability. This is being considered in conjunction with other European nations.

Mr. OSTERTAG. In that event, they would have the benefit of our development of boosters. Is that not the sum and substance of the situation?

Mr. WEBB. Not the technical knowledge. They will have to know enough about the booster to match the satellite to it. They will have to know the vibration levels at various speeds before it leaves the earth's atmosphere, and this kind of thing. But insofar as the technology of the booster, they would not know that unless they obtained it through military channels, through military cooperation. They would not learn it from us.

Dr. NEWELL. That is true.

Mr. JONAS. As a matter of fact, it amounts to a very minor expenditure so far as money is concerned, in both instances. If we use our own boosters and do the launching, all they do is build the spacecraft itself. Is that right?

Mr. WEBB. That is right, and do the scientific work leading up to the detailed experiment, which means they must follow a great deal of the scientific work in the whole field to know exactly how the experiment would fit in with the whole state of the art.

Mr. OSTERTAG. But their satellite is not worth anything without the development we are able to provide for it.

Mr. WEBB. It could not fly without our booster, but the point is that we would want to conduct an experiment like that to gain that information, if they did not do it, and it is the application of effort and brainpower by their scientists that is the most beneficial to us.

Mr. JONAS. How did we miss that aspect of science and technology? I thought we had a satellite for every known objective.

Mr. WEBB. No, sir. We are eliminating that from any other part of our program because we are counting on that to give us the information in that field.

Dr. NEWELL. Mr. Chairman, I should like to point out that when the question was asked as to whether the booster would be the greater part of the cost, I had to hesitate, because in general satellites are now costing about as much as the boosters to launch them. In this

particular case my answer is correct, the booster will cost more, but as we progress with this program we will be finding that the participating countries will be contributing an increasing share of the total cost of the project.

DEVELOPMENT OF SPACE PROGRAM WITH RESPECT TO INTERNATIONAL COOPERATION

Mr. EVINS. Mr. Administrator, in round figures, what is the space budget of our allied countries, cooperating countries, Canada, England, and others?

Mr. WEBB. This is a pretty complex question because we have had, as a matter of policy in this country, the problem of whether to help these nations achieve a rocket capability, a booster capability, and this has caused grave concern from the foreign policy and military aspects, because when you achieve rocket capability you also advance to some extent the nuclear capability of these nations. Basically, the situation is that all of these nations are cooperating with us through the North Atlantic Treaty Organization in many other relationships, military and semimilitary, as well as economic development, and moving on, as you know, toward even a broader consideration through——

Mr. EVINS. Do you not have some information regarding the budgets in the field of space that are seperate from defense?

Mr. WEBB. I am not so sure it can be very easily separated out in some of these countries.

Mr. EVINS. We can separate ours.

Mr. WEBB. Yes, but the other countries, certainly so far as the U.S. knowledge——

Mr. EVINS. Are we following the same pattern here that we did in atomic energy? We developed atomic energy, and as soon as we developed it, we began giving to other countries all the scientific information and all the data. We were very generous and followed a pattern of cooperation, even to the point of taking it to them free. We discovered it here. We would charge our schoolchildren to go into the exhibits to see it, whereas in England and other countries we took it to them with mobile, portable exhibits.

Mr. OSTERTAG. It is generally accepted that certain of these nations stole it.

Mr. EVINS. Yes. After we developed the art and science, then it was given away. Now we have an enormous budget for an extensive space program. After we develop it, are we going to give it all away? Are we going to get any quid pro quo? Are we going to get any cooperation?

I read somewhere that the Soviets are really more concerned about tractors and bulldozers and farming equipment now than spacecraft, now that they have psychologically alerted the world that they are advanced. What is the picture regarding their budget, so far as you are able to determine?

DISSEMINATION AND AVAILABILITY OF INFORMATION

Mr. WEBB. In answer to your first question, namely, concerning our allies, we are administering here an act which requires this agency to

consult with the scientific community with respect to its planning and program and report not only to the scientific community but to the public at large with respect to our activities and the results thereof. This is part of an effort to project the image of the United States as a nation wanting to work with other nations to develop science and technology, the image of a nation leading in this field and willing to share this knowledge with other nations.

While we hold this out as a hope and implement it as a practical reality in every way we can, we still are protecting those things which are essential for military use. There are several different philosophies about this.

Mr. THOMAS. I believe it would be well for the record if the chief counsel were to read some sections of the 1958 act into the record at this point. Will you yield for that purpose, Mr. Evins?

Mr. EVINS. Surely.

Mr. THOMAS. Have you that available?

Mr. WEBB. Has anybody the 1958 act?

Mr. THOMAS. From the original act.

Mr. WEBB. I stated it briefly.

Mr. THOMAS. Does anybody have it available? Is your Chief Counsel here?

Mr. OSTERTAG. Would it not be well to insert it in the record?

Mr. EVINS. Supply the specific statutory requirements for the record at this point.

Mr. WEBB. All right. If you will give me the Code of the United States, I will pick it out for you.

(The information requested follows:)

PROVISION IN THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ACT (42 U.S.C. 2451 ET SEQ.) RELATING TO DISSEMINATION OF INFORMATION AND ACCESS TO INFORMATION

SUBCHAPTER I. GENERAL PROVISIONS

2451. Congressional declaration of policy and purpose.

(a) * * *

(b) * * *

(c) The aeronautical and space activities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:

(1) The expansion of human knowledge of phenomena in the atmosphere and space;

(2) * * *

(3) * * *

(4) * * *

(5) * * *

(6) * * *

(7) Cooperation by the United States with other nations and groups of nations in work done pursuant to this chapter and of the peaceful application of the results thereof; and

(8) The most effective utilization of the scientific and engineering resources of the United States, with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

(d) * * *

2455. Security requirements.

(a) Establishment; investigations; referral to Federal Bureau of Investigation.

The Administrator shall establish such security requirements, restrictions, and safeguards as he deems necessary in the interest of the national security. The Administrator may arrange with the Civil Service Commission for the conduct of such security or other personnel investigations of the Administration's

officers, employees, and consultants, and its contractors and subcontractors and their officers and employees, actual or prospective, as he deems appropriate; and if any such investigation develops any data reflecting that the individual who is the subject thereof is of questionable loyalty the matter shall be referred to the Federal Bureau of Investigation for the conduct of a full field investigation, the results of which shall be furnished to the Administrator.

(b) * * *

2473. Functions of the Administration.

(a) The Administration, in order to carry out the purpose of this chapter, shall—

(1) plan, direct, and conduct aeronautical and space activities;

(2) arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; and

(3) provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

RELATIONSHIP OF MILITARY AND CIVILIAN SPACE PROGRAMS

Mr. WEBB. The thing I want to say, also—and I was going to follow this up to complete the answer to Mr. Ostertag's question—there is a provision in the law which says there shall be a military program as well as a civilian program. So, when you speak of our sharing all of these things and publishing the information, you are speaking only of the civilian program. The military program is going forward under proper military security and management, and the law specifically exempts from our agency the development of space technology for weapons systems, and so forth, and assigns this to the military.

Mr. OSTERTAG. The point I was particularly concerned about is the ability to divide or separate what actually might have military significance and what does not.

Mr. WEBB. Yes. Let me go on with that just for a minute. The point I want to make is that there are two programs, that we have close working relationships with the military, that they have certain things which are specifically and clearly military, and we have those which fall under other provisions of the act, but we are conducting our program so as to make it easy for them to get the transfer. Since we have the manned space flight program and the use of men for the rendezvous technique, both of which are very important for future military considerations, we have conducted those in the closest cooperation and coordination with them.

Even beyond that, we have planned our whole complex of facilities to support this program to work in the closest conjunction, and in some cases we have merged the facilities, such as we have done at the Atlantic Missile Range. The assembly of the big boosters, the Mississippi test facility for testing of them are all in a relationship where they form a compact set of facilities which could be relatively easily taken over for military purposes should we find that the present policy line of conducting the civilian program in the manner it is now being conducted would not be wise in the future.

There are these elements in the civilian program which support the military: First, just as we do the aeronautical research for military, civilian, and every other area of the Government and have the only large research tools for aeronautical research, so do we do this kind of things affecting space technology. Second, we conduct, specifically, programs which tell us how men can live and work in space.

Once you find that out, the military can simply use it just as if you find out how men live on the surface of the sea or in the jungles or in high altitude airplanes.

Mr. OSTERTAG. If we share that with other nations, particularly the Soviet Union, then what happens?

Mr. WEBB. They have the benefit of this open report of the Glenn flight which we made on April 6.

Mr. OSTERTAG. But it might have military significance.

Mr. WEBB. They will learn a good deal from this kind of thing. So in a sense we are cooperating with them, but not getting very much in the way of return cooperation.

Mr. OSTERTAG. That is what I am worried about.

SPACE BUDGETS OF COOPERATING NATIONS

Mr. EVINS. You have no information available which you could supply the committee as to the space budgets of cooperating countries and others?

Mr. WEBB. Not this morning. We will look that up and see what we can give you on that. Whatever we can give you, we will give you.

(The information requested follows:)

SPACE BUDGETS IN COUNTRIES WITH WHICH NASA HAS COOPERATIVE PROGRAMS

Argentina: Budget not known.
Australia: Budget not known. Rough estimate of cost to Australians for their VLF experiment to be flown on a NASA sounding rocket is $25,000.
Brazil: Budget not known.
Canada: Budget not known.
Denmark: Budget not known.
France: Approximately $18 million proposed for 1962.
Germany: Approximately $9 million proposed for 1962.
India: Budget not known.
Italy: Approximately $7 million planned for national program during 1962–65.
Pakistan: Approximately $250,000 planned for four sounding rocket experiments using sodium vapor payloads to measure parameters of the upper atmosphere.
Sweden: Approximately $300,000 for 1962.
United Kingdom: Budget not known.
New Zealand: Budget not known.
Norway: Budget not known.

Only limited information is available to NASA on the budgets for space activities in foreign countries. However, it should be pointed out that in most cases a coordinated space budget does not exist. Much of the research in space sciences carried on abroad takes place at universities and governmental laboratories with broad scientific interests.

Contributions by other countries to NASA tracking and data acquisition stations abroad

	MERCURY	Minitrack	Deep space	Optical
Argentina				Land.
Australia	Land (2 stations)	Land	Land	Do.
Canada	Land and operating costs.			
Chile	Land (2 stations)			
India				Land and operating costs.
Iran				Land.
Japan				Land and operating costs.
Mexico	Land			
Peru		Land		Land.
South Africa		do	Land	Do.
Spain	Land			Do.
United Kingdom		Land and operating costs.		

LEADERSHIP IN SPACE

Mr. EVINS. Let it be said that we are the leaders in knowledge expended, whether we are the leaders in all phases of development or not.

Mr. WEBB. I believe we are the leaders in all phases except having the large proven boosters. We have very large boosters coming along under test, but we have not got the large proven boosters that the Russians have. In the rest of it, I feel sure we are in a period of buildup where we shall far exceed their capability. I think this gives them some very real concern.

Mr. EVINS. Is there any accuracy to the observation that the Soviets may now be concentrating a little more on agriculture, tractors, and farm improvements, rather than space?

Mr. WEBB. They certainly have a great many problems all through their economy, but there is no information that I know of to indicate that they are not going to develop their space capability or, may I say, their military capability. It seems to me that we must not move up and down in response to reports that the Russians send out. You know, they sent out quite a bit of data saying that manned space flight was a little bit dangerous and Titov had not survived so well his experience in space, but we did not pay any real attention to that. We went right along and conducted the Glenn flight. Our purpose is to go right on and conduct these flights. We will be making manned flights every 60 or 90 days and find out for ourselves, and not move our program up and down in response to whether the wind blows gently or in a storm from Russia.

COOPERATION OF SOVIETS

Mr. EVINS. What is the factor that has caused the Soviets to have an attitude of desire for cooperation and exchange of information, whereas previously they had a superior feeling that they had all the facts, all the knowledge, and did not want to disclose it or engage in any form of cooperation?

Mr. WEBB. We do not know yet that they want cooperation, but if there has been any change, I think it is the massive forward drive of our program which shows we are going to be the leaders, and a concern on their part as to whether they can keep up with us. That is why I think it very important not to slow up our programs until we clearly achieve the kind of superiority that the whole world seeks.

Mr. EVINS. Also, it is a form of public acknowledgment that we are excelling and are superior. They have now been awakened to that?

Mr. WEBB. No, sir; I stated it differently. I think it is the trend of our development that worries them, because they see this trend achieving results that they would have to expend vast energy to achieve. We clearly are beginning to move toward worldwide operational systems of communication satellites and of weather satellites. We have conducted this program with 40 million American homes looking at it and some 25 million Englishmen looking at it on television, and with the feeling all over the world that there is no doubt about what the Americans did and some doubt about what the Russians did. All of this is a trend in the direction that they see will undermine this image they have tried to create that they are ahead of the world in rocketry.

POTENTIAL DISAPPOINTMENTS AND FAILURES IN SPACE EFFORTS

Mr. EVINS. You are a very good television star yourself, Mr. Webb. We have seen you, and you have alerted the American public and warned them that, while we have had successes and we are pleased with our successes, we may be in for some disappointing failures and situations which may be alarming to the American people.

Mr. WEBB. I did not say "alarming." I said with the state of the art of the rocket, as Dr. Dryden has said, the lack of perfection of the rocket, we will have failures as well as successes. All of the statistics show that even in very advanced aircraft there are failures. We have seen it with the Electra, and even the 707 does not work perfectly all the time. The rocket is certainly not as reliable a vehicle as an airplane, so you will have failures.

What I said was that the American people, I hope, will come to understand that we learn from the failures more than we do from the successes, in many cases; that so far as the perfection of the equipment is concerned, when a failure occurs and we find out what caused the failure, we can correct that.

The second thing I said is that if the American people want to participate actively as spectators on television to these flights, they will be there when the failures occur as well as when the successes occur. I did not say they should be alarmed at this. I said, on the contrary, they should not be alarmed at it.

Mr. EVINS. You were steeling the American public against reverses, hazards, and failures which inevitably will come as we continue this program.

Mr. WEBB. And trying to direct their minds toward the essential element of a continuous, ongoing flight program where we learn from every flight and, secondly, that the failures really do contribute very greatly to the long-term success of the program, because it is through the failures that we identify the weak points and can correct them. I wanted the public to understand that.

ADVANTAGES OF PUBLIC NATURE OF U.S. SPACE PROGRAM

Mr. OSTERTAG. Mr. Webb, just this past weekend I was privileged to witness the naval operations and maneuvers down around Mr. Jonas' territory in North Carolina, and on this trip at least 30 ambassadors and representatives of our allies accompanied us. A distinguished ambassador representing one of our neighboring Latin American countries commented to me that one of the most outstanding achievements of our Nation, particularly on the point you are making, was the viewing, the sharing, and allowing our failures as well as our successes to be exposed. He pointed out how significant to all of these other nations was our confidence in our ability to show this and to expose it as compared with the technique and the operation of the system that is employed behind the Iron Curtain.

Mr. WEBB. Mr. Ostertag, taking the failures along with the successes, there is no doubt that the world, looking at this program, is going to consider it a great forward movement in many fields of science and technology.

IMPORTANCE OF SPACE PROGRAM TO MILITARY PROGRAM

I would like to conclude my statement about the relations with the military by saying some people doubt very much if the Russians would have moved as aggressively with respect to Berlin if they had not had such successes in space. You know, we had to add about $6 billion to our military effort per year to get in a position not to have our influence around the world eroded by what was happening in Berlin.

If the present indication of a desire to cooperate is handled properly on behalf of this Nation, in the light of all the experience we have had with the Russians since World War II, there is a possibility President Kennedy may be right and we may be entering a period when some of the most difficult problems which face us, on the basis of a crisis suddenly arising, may not occur because there may be much more concern as to whether it can be carried off.

These are very important dividends from this program, not the least of which is the fact that, while most of us participated in the Glenn flight as spectators, the nationals of many nations participated actively in the program, not as spectators, and as we develop this cooperation around the world, this side of the Iron Curtain, this also is a very important factor in our ability to do all the things we want to do as a nation, and a very important image for the Russians to keep in mind.

Mr. OSTERTAG. Did you not at the time of the successful launching of *Friendship VII*, putting a man into space, have an international team right on the scene witnessing not only the launching but the fact that Glenn was in the capsule, and every other aspect of it?

Mr. WEBB. We had an international team all around the world, because nationals of other nations were in these tracking stations. For instance, when Cooper was out in Australia, because this is the last point that Glenn would pass over before reaching a decision as to reentering or not, the Australians were right in that station doing the work, manning that station and carrying on the work. This went on in many places where the nationals were actually working and contributing to the success of the flight.

Mr. RHODES. Did I read in the paper during this last week that you intend to have less public information available about unmanned satellites in the future?

Mr. WEBB. Not our program. I believe you must be referring to the military program.

Mr. RHODES. The MIDAS program.

Mr. WEBB. Yes, sir. That is the military program. We have had no change in policy with respect to this agency, because the law clearly states that we have to do these things in the way we are now doing them.

May I say just one last thing about this, Mr. Chairman.

Mr. THOMAS. Take your time.

Mr. WEBB. I think it very important as we look at these programs not only to recognize that we are pushing the state of the art to the limit, we are asking this committee to approve funds to spend over a period of 10 years some $35 billion advancing science and technology at the most rapid rate it can be advanced, but also spinning it off and feeding it back into industrial growth and economic development. This would be a very difficult, if not impossible, task if there was a cloak of secrecy around this program.

I mentioned earlier in this committee that in the same 10 years when we are spending $35 billion, you have a total of about a trillion dollars going into construction plus maintenance and repair for this country. The areas of energy use, electronics, new materials, metals, fabrics, the whole area of medical science, will benefit tremendously in this whole period.

Even more important than that, Mr. Ostertag, if we can find a proper dividing line between the civilian and the military programs so as not to lose the military values that we must preserve, we are in this open way exposing the problems just ahead of us to the largest number of able minds all around the world. This is really the way mankind has made its forward advance. No one can tell from which mind comes the solution to a problem. We all know if we spread the problems over the largest number of able minds, which is the basis for scientific development, with research openly carried out and reported in the universities, we make progress. I think the progress which can come from this can never be matched by Russia and the nations which do these things in secret.

Mr. OSTERTAG. On the point that Mr. Evins made, other nations developed atomic energy, yet we all recognize that in the first instance the research, the development, and the actual reality of atomic energy was stolen from this country. I assume in this case there might be further instances where they glean from our developments, even though they may be secret.

Mr. WEBB. The only protection, I think, is to move as fast as we possibly can and set a very fast pace. In the atomic bomb, they achieved this within a very short period of time after we did. With respect to the hydrogen bomb, I believe it was only some 9 months after we achieved it that they achieved it. This shows their capacity to concentrate resources at one point to the neglect of agriculture and other things. How long can that really go on in a society involving over 200 million people?

Mr. OSTERTAG. Money is not the whole factor, is it?
Mr. WEBB. No, sir.

PLANNING AND BUDGETING THE SPACE PROGRAM

Mr. OSTERTAG. After all is said and done, you can reach a saturation point where, no matter how much money you pour into it, you are just overdoing it because in progress and development, time and brains are in element.

Mr. WEBB. That is correct. The program we are presenting to you is not that kind of program. It is not a crash program. It is a program aimed at forecasting the most rapid progress you can make under the known state of the art and the projections of advances yet to come, but with two governors on the machine, so to speak. The first is the experimental flight program with business management so keyed that you can slow up the expenditure of funds or speed it up, depending on the progress you make, proved by your experimental flight program. The second is a continuous analysis through a corporation that we have asked the American Telephone Co. to form, on the manned space flight program, which is the largest of these programs. They are going to assign 200 of their ablest men from the Bell System, from the Bell Telephone Laboratories, and from the Western Electric Co., to work full-time for the Government with a lot of computers and mathematical and other types of analysis where they will be testing every concept that underlies the expenditure programs continuously. So, we will have the experience coming in from the actual flights we make with MERCURY, then with the 1-day mission with MERCURY, then with the 1-week mission with GEMINI, and then with APOLLO, and at the same time these 200 men will be constantly analyzing every facet of that. We will have these two means of getting information effectively to manage the program.

Mr. OSTERTAG. What was the original budget for the Space Agency?

Mr. WEBB. About $339 million was appropriated the first year, including funds transferred from the Department of Defense.

Mr. OSTERTAG. And this year it is about $3.5 billion?

Mr. WEBB. We will spend about $2,400 million in fiscal year 1963. The appropriation request is $3,787,276,000 exclusive of the supplemental.

Mr. OSTERTAG. It has been moving forward and upward at great speed.

Mr. WEBB. Right.

LEVEL OF OPERATIONS AND CURRENT PROGRAM EMPHASIS

Mr. OSTERTAG. Where and when do you feel there will be a leveling off or a degree of stability insofar as what would be a normal requirement?

Mr. WEBB. Mr. Ostertag, if we had gone forward with the original plan to develop the solid fueled rockets and the facilities to test and fly them on a parallel schedule with the liquid fueled rockets, and developed the NOVA on the same time scale as the advanced SATURN, we would have leveled out, I would guess, somewhere

between $6 and $7 billion per year. We have eliminated the solid fuels insofar as building the facilities to test and fly them. We have concentrated by having the Air Force do research and development. So, you find very little funds for solid fueled vehicles in our program, except for special purposes.

Second, after careful analysis, we have forecast success for this rendezvous technique. We are going to prove that by having the Air Force launch an AGENA on an ATLAS, and when the AGENA is in orbit we will bring the GEMINI up to it and try to begin to latch on and find out if rendezvous works. This means at the moment in this budget we are emphasizing the advanced SATURN; and most of the money for the launching, the static tests, the assembly, and the building of the rockets is on the advanced SATURN. By far the largest part of this budget goes into this type of support.

If we find that this does not work, we will have to slow up the SATURN and speed up the NOVA, which gives us the ability for direct ascent. By cutting out the funds for the solid parallel development and by deferring the NOVA on the assumption we can make the rendezvous work, we will level out at somewhere between $5 and $5.5 billion, approximately $5.2 billion.

Mr. THOMAS. Mr. Administrator, when you say you eliminated solid fuels, as well as I remember there is $17 million plus Mr. McNamara's $1 billion on the solid fuel. You have about $17 million this year.

Mr. WEBB. His is a military utilization. He has about $40 million to develop the kind of large rocket motors, solid fuels that we would need for manned space flight. He is developing the 120-inch solid motor for the TITAN III, but we have asked him to develop a 156-inch solid and a 280-inch solid, with the idea that these may become the workhorse of either a military or civilian program in the period of somewhere between 5 and 10 years. At the moment they are not being pushed at the same rate, nor are we building the facilities to use them. We are doing the research on them.

In order to keep this budget down within these limits, we have eliminated these two things that might possibly give us some time benefit in the late sixties.

COST OF SPACE PROGRAM

Mr. OSTERTAG. Somewhere along the line, would it be possible for us to have the general timetable of all your programs and the meaning of them?

Mr. WEBB. Could we go off the record a moment?

Mr. THOMAS. Yes.

(Off the record.)

Mr. WEBB. I wanted to give you two thoughts: $35 billion in 10 years, with the level rising to somewhere between $5 and $5.5 billion, in that general area. I want to make two comments on that, if I may.

IMPORTANCE OF ORBITING OBSERVATORIES

With respect to the payload, the things that you are using the rockets to send up, we moved very rapidly from a situation where we put one or two experiments in a specially designed satellite, flown on a military-developed rocket, to the point that we now have such

major instruments as the orbiting solar observatory. We launched one a week after the Glenn flight. It probably is more important scientifically than the Glenn flight. It has 12 experiments on it. We have developed this vehicle to use for 11 years over the entire life of the sunspot cycle where we can take from 12 to 18 measurements more or less continuously over that 11-year period to understand the relationship between the Earth and the Sun, which probably will give us information which will affect every process industry existing in the United States. I mean by that, the knowledge we will gain of the energy transfer and the additional ability to understand the laws of nature and predict how they operate will come from outer space, but it will be applied in these major process industries.

Mr. THOMAS. What do you mean by process industries?

Mr. WEBB. Petroleum would be one, petrochemical, rubber—any involving continuous processing. I am not thinking of assembly and manufacture, although new materials and metals and things like that are affected, but where you are using chemistry to tear apart the thing man digs out of the ground or extracts from growing things like crops or trees, and then puts them back together to make the building blocks, energy, and all the other things that we use in this country. These are what I would call process industries.

Mr. RHODES. This is rather similar to a project that we are financing through another Foundation of the Government, the National Science Foundation. I refer to the solar observatory on Kitt Peak in Arizona. Does NSF share with you?

Mr. WEBB. Yes, we are in very close touch. We have the ability out beyond the Earth's atmosphere to make these simultaneous measurements of a dozen things, of looking at the Earth and the Sun and the universe in ultraviolet light, things you could never do through the atmosphere. Wherever you can do the work on the surface of the Earth, which is a lot less expensive, we do it or work with them to do it or use a laboratory like the one in Panama.

Mr. RHODES. They are in partnership with you on this?

Mr. WEBB. That is right. For instance, the balloon flights we will conduct to get up and do part of this work without ever getting in a satellite.

The point I wanted to make, Mr. Ostertag, is that you have these large observatories—the orbiting solar observatory, the orbiting astronomical observatory, and the orbiting geophysical observatory, all of which will be more expensive, as Dr. Newell has said, but which give us a vast array of information we never had which will be put together in a pattern which will increase by some substantial amount our knowledge of the basic laws of nature and how to apply them.

COST OF RESEARCH AND TECHNICAL DEVELOPMENT AND FLIGHT PROGRAMS

The second point—and then I will be through, if you will permit me——

Mr. THOMAS. You are just getting started.

Mr. WEBB. The ability to fly these kinds of large vehicles costs a great deal of money. The only way you can get out into the area beyond the earth's atmosphere with these very large vehicles is to have the booster power to put you there. I would like just to give you two or three figures to give you an idea of what that means. In sounding

rockets, which we have been using for 15 years or longer, for next year our advanced research and advanced technical development is not a great deal bigger than 1962, which again is not a great deal bigger than 1961. In 1961, we had roughly $1,800,000, and in 1963, $2,469,000. There is an increase, but not a vast increase. But in the flight program, the cost of flying these has moved up from $10.5 million to $16.7 million. This is just in the area of sounding rockets.

Let me take scientific satellites again, to show you that a large amount of this cost is in the development of the rockets, in the development of the ability to fabricate these big rockets and then take them to Cape Canaveral and launch them. But the very ability to build and launch big rockets is the capacity we are looking for in this Nation because, while they are going to do useful work here, we do not know what further useful work, military or otherwise, they may be needed for in the future.

In scientific satellites, our cost of research and technical development for 1963 is $33,679,000, but to fly those experiments costs $141.5 million. There again, that $141 million is up from about $90 million the previous year.

Let us go on to the lunar and planetary exploration work, which is an active program to explore all of the space between ourselves and the Moon, and the Moon itself and the Earth, preparatory to having men work there. Here again, the advanced research and technical development is $32 million in 1963, the flight program $241.6 million. So the money is going into the flight program, but this is developing the power this Nation needs in the way of big boosters.

Mr. OSTERTAG. That is not the total.

Mr. WEBB. That is unmanned lunar. I shall give you the advanced flight program.

Mr. JONAS. That is just 1 year.

Mr. WEBB. That is 1 year.

Let us look at the advanced manned space flight. Everything I have given you up to now is unmanned.

On the manned flight, we still have on the order of $30 million, $31,084,000, for advanced research in aerospace medicine and spacecraft technology in 1963, but for the flight program, $832.5 million. This is going into the big boosters, the ability to assemble them, to test them, to transport them to Cape Canaveral and to launch them.

That is where the money is really going, and this is the thing that gives us the capability to lead the world out in space—power.

SCHEDULE FOR SPACE PROGRAM

Mr. OSTERTAG. But I was attempting to determine if we could see the picture or the schedule of these projects and these programs. Is it not fair to say that when we consider your justifications, that automatically is a part of your presentation and it would be revealed?

Mr. WEBB. Yes, although I am sure where we may develop toward military and other applications where we do not necessarily want to notify the Russians of details of our program, you would not want all of that detail.

Mr. OSTERTAG. All I was attempting to determine and may I say you would package it rather than have it spread out in the justifica

tions, which will automatically unfold and anything that should not be made public or revealed and that is one thing. But, it seems to me, that there is a schedule and it has been a matter of general information heretofore.

Mr. WEBB. What I am trying to say is that while we have had this schedule and it is based on the assumption that we can advance very rapidly in certain technologies, leading to rendezvous, nevertheless we have built a system of flexible management into this program so that if that does not work we move to the next. We are giving you a $35 billion figure for about 10 years and we are also saying that whereas we have been doubling every year up to now since about 1958, we are going to slow down and perhaps go something like a billion dollars for 1964 and perhaps something a little less than a billion dollars for 1965.

You are looking at an area here where, if you succeed and prove you can do these things, you are moving about at that rate. If, at any point, you strike an insuperable obstacle, you will slow up and until you solve the technical problems, it is not a crash program.

AUTHORITY FOR DISSEMINATION AND RESTRICTION OF INFORMATION

Mr. JONAS. Let us get this read into the record, the authority on which he says we have to give all of this information to the Communists.

Mr. WEBB. The statutory authority is in chapter 26 of title 42 of the United States Code, subchapter I, paragraph 2454, entitled "Access to Information" which reads as follows:

Information obtained or developed by the Administrator in the performance of his functions under this chapter shall be made available for public inspection except, (*a*) information authorized or required by Federal statute to be withheld, and (*b*) information classified to protect the national security: *Provided*, That nothing in this chapter shall authorize the withholding of information by the Administrator from the duly authorized committees of the Congress.

Mr. JONAS. Do not close that book.

Off the record.

(Discussion off the record.)

Mr. OSTERTAG. There is a matter of discretion, is there not, as to what actually is or is not classified?

Mr. WEBB. Yes, sir, and we exercise it. There is also a very active press in this town.

Mr. JONAS. Where is this reference (b) to be found? Can we see that?

Mr. WEBB. Reference (a)?

Mr. JONAS (reading):

Information authorized or requiring——

Mr. WEBB. That is just section (a) and they are stated fully there.

Mr. JONAS. It is required by Federal statute to be withheld? What does that encompass?

Mr. WYATT. This covers certain aspects of the AEC work, nuclear rockets.

Mr. JONAS. Would it not cover anything developed in the field of space?

Mr. WYATT. No, sir. There is no statute or overriding law such as the atomic energy law relative to the whole space field but we are subject to the atomic energy restrictions, of course.

Mr. JONAS. You think that under this section you will be required to make available for public inspection all of the information that you develop as a result of all of these experiments?

May I read you another section of the statute?

Mr. JONAS. Read me one that will restrict this a little bit.

Mr. WEBB. I was going to read one that states the policy of Congress with respect to the openness of the program.

Mr. JONAS. All right.

Mr. WEBB. This is subchapter I, paragraph 2451, congressional declaration of policy and purpose:

(A) The Congress declares it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind * * *.

Then it goes on to state the necessity for security classification of certain of the data in paragraph (B) and then in (C) it lays down the policy under which the aeronautical and space activities shall be conducted. The first of these is the expansion of human knowledge and phenomena in the atmosphere and space; (2) the improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles; (3) the development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space; (4) the establishment of long-range studies of the potential benefits to be gained from opportunities for and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes; (5) the preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere; (6) the making available to agencies directly concerned with national defense of discoveries that have military value or significance and the furnishing by such agencies to the civilian agencies established to direct and control nonmilitary, aeronautical space activities of information as to discoveries which have value or significance to that agency.

There is a restrictive feature.

Now, as to the next one, No. 7, cooperation by the United States with other nations and groups of nations in work done pursuant to this chapter and in the peaceful application of the results thereof; (8) the most effective utilization of the scientific and engineering resources of the United States with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

Mr. RHODES. Off the record.

(Discussion off the record.)

AVAILABILITY AND PUBLICATION OF SPACE INFORMATION

Mr. RHODES. Speaking of item No. 7, would you think that cooperation was a one-way street? In other words, do you think you are required to give information if you do not get information in return from other nations?

Mr. WEBB. Congressman, the kind of cooperation we have sought has been the kind of thing that has permitted us to build this worldwide tracking and data acquisition program throughout the world.

Mr. RHODES. You do not understand the import of my question apparently. I am talking about sharing information with the Communists on a one-way basis. In other words, we share the information and we do not get anything in return. Do you think there is a congressional policy requiring you to do that?

Mr. WEBB. Well, the congressional policy is quite clearly stated that we have to provide access to the information obtained or developed in the performance of this program.

Mr. RHODES. To whom?

Mr. WEBB. Except where they are classified.

Mr. RHODES. Wait a minute. To whom?

Mr. WEBB. Well, if it is published, it is available to anyone——

Mr. RHODES. Nothing you have said or read stated anything like that.

Mr. JONAS. In the section you read first, it does not say you have to publish it. There is a great deal of difference in having it available for public inspection and preparing pamphlets and distributing them around the world, is there not? There is a lot of information available for public inspection in the Internal Revenue Service but they do not send that information out and publish it in all the newspapers.

Mr. WEBB. Basically what we have endeavored to do is to handle the information side so as to make the most rapid progress in the state of the art and scientific community and in our cooperation with other nations. If the information is available for public inspection, it certainly is going to be available to the Russians and others who are looking for it.

Mr. JONAS. How?

Mr. WEBB. If it is available for public inspection; as a matter of fact, the press demands this information. They want to know from every flight what was the purpose of it. What did you learn from it?

The technical journals are tremendous consumers of this and they do not wait for you to publish a pamphlet. They are in all the time wanting to know what is going to happen 6 months from now.

Mr. JONAS. You do not necessarily have to run the Government and NASA in order to satisfy the press.

Mr. WEBB. No; but it is pretty hard to answer Congressman Moss here and his committee when it says, "shall be made available for public inspection" and you deny it to the press.

As a matter of fact, we have had some fairly vigorous correspondence with him on this very subject in which he has been charging from time to time that this kind of information was not made available. I think we have satisfied him that we are doing——

Mr. JONAS. Do you think that these words require you to prepare the information and distribute it? That is a little different than having it available for public inspection. Some people cannot interpret all of this scientific language and jargon that is used in describing these things. It seems to me there is considerable difference in the way you would be required to handle it if you make it available for public inspection that could be construed as having it available for somebody to come down and dig it out which would certainly——

Mr. WEBB. If you read the legislative history, I believe you will find that the main purpose of this type of language in the law was to endeavor to develop an ongoing worldwide development of space for peaceful purposes for the benefit of all mankind.

Certainly, you do not conduct that, Congressmen, without having the material published. As a matter of fact, in certain areas here we are trying to find a way to implement which will collect technical data in such a way as to make it more useful in the program.

Mr. OSTERTAG. Mr. Webb, are there not two points involved here? One is the one Mr. Rhodes brought up and the word "cooperation" is embodied in this statute; but cooperation means cooperation in sharing equally and negotiating for this information. Now, we are advancing it without regard to cooperation apparently.

CLASSIFICATION OF SECURITY INFORMATION

The other point I would like to make is that the words "peaceful use" are limitations there as against security. Who, where, and how are you going to determine the difference between what is peaceful and what ultimately might not be peaceful?

Mr. WEBB. Let me read you another paragraph there from this same chapter, paragraph 2473(A):

> The administration in order to carry out the purpose of this chapter shall: First, plan, direct, and conduct aeronautical and space activities; second, arrange for participation by the scientific community in planning scientific measurements and observations to be made through the use of aeronautical and space vehicles and conduct, or arrange for the conduct of, such measurements and observations; third, provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

That is pretty broad language in the legislative history which indicates the purpose as I have previously stated. It does give latitude where you say "practicable and appropriate."

Nevertheless, there is a legislative history here.

Mr. RHODES. Mr. Webb, I do not know whether I would define the words "peaceful purposes" the same as you apparently do. I do not think the peaceful purposes of the world are served by letting the Russians have secrets which they would have to spend a great deal of their national output and national wealth to obtain otherwise. It allows them to take their limited resources and put them into other uses which might not be so peaceful. I do not think, in dealing with the Russian state, we are dealing with a peaceful government. I think the people are as peaceful as any other people, but I doubt that their government is.

In the language you have read, there has been qualifying language on classification for security purposes. Who classifies these matters as to security?

Mr. WEBB. The military people.

Mr. THOMAS. To prevent duplication of costs.

What about duplication in our own government?

Mr. RHODES. That is true. In other words, you have nothing to do with the classification?

Mr. WEBB. We have authority to classify.

Mr. RHODES. As far as the manned flight data was concerned, was it screened by all three agencies, before we released it?

Mr. WEBB. I am certain that it was.

Can anyone answer that specifically?

It was only the launch technology that was involved where any security was involved.

Dr. SEAMANS. I think it is important to realize we did not release information on the ATLAS booster. That is part of a weapons system and is an area where national security would be involved. We obviously comply with all of the Department of Defense regulations with regard to that booster.

Mr. WEBB. Can I say one thing there?

Mr. RHODES. Go right ahead.

COOPERATION IN FIELDS OF WEATHER AND COMMUNICATIONS

Mr. WEBB. I agree completely with what you say about the desirability of not giving the Russians free anything you can avoid giving them without doing more damage to ourselves than you would otherwise. I think the point partly is that as we move to practical applications in the communications satellite field, we have four nations cooperating with us to establish ground stations and to work with us. Intercontinental television is only possible if there is a receiving nation on the other end.

It would be almost impossible to build the worldwide system of communications via satellites to augment the common carrier resources of this Nation on any classified or secrecy basis.

With respect to the meteorological satellite system, which is another worldwide operating system which is moving forward, there are funds in the budget for the Weather Bureau to establish it. There again the main purpose that we are after is to have the nations cooperating in this all around the world take the data from the satellite ultimately when this becomes possible, compare it with the data they get from the ground and produce summaries which we and the other nations then get that will give us worldwide pictures.

Right now we are only covering about 20 or 25 percent of the world with observations. Again, this kind of thing comes right out of this program and is of such a nature that secrecy is self-defeating. We have that kind of a situation in addition to the other.

Mr. RHODES. I am sure that is true, Mr. Webb.

MODIFICATION OF POLICY FOR DISSEMINATION OF INFORMATION

The only thing I was worried about—and the other members share my worry—is that perhaps you feel Congress has directed you to make wider dissemination of all information than we feel to be the case. I do not think Congress wants you to share all of these things with the Russians unless you feel it is self-defeating not to do so.

Mr. THOMAS. Here is a case where one of our own committees the other day wanted more and more to satisfy the appetite of all publications. All they have to do is sit down in the Press Gallery and find out everything they want.

Mr. WEBB. Could I say one thing first?

Mr. JONAS. Yes.

Mr. WEBB. I think we have found a reasonable administrative line to follow here and there is not anyone in this agency who is anxious to help the Russians, insofar as it is against our national interests to do so.

Mr. JONAS. That leads me to the question I wanted to ask. How much can be done? Have you asked the legislative committee to look at section 303 with the idea of modifying it?

Mr. WEBB. No, sir; I have not.

Mr. JONAS. Would you be in favor of modifying it?

Mr. WEBB. I am not sure at this time. I would like to know precisely what the modifications would involve.

Mr. JONAS. I want you to provide them, or suggest them. You have been in this long enough to know what we can give away. Why should the Russians keep on spending money if we are going to spend $35 billion and then turn over to them all the information we get?

Mr. EVINS. I agree with Mr. Rhodes and Mr. Jonas. I think there is a feeling that you ought to be a little more adamant in the exercise of your discretion.

Mr. WEBB. Do you have a case where you feel we have been unwise?

Mr. EVINS. I cannot specifically point to any case, but the powers in the act are there for you to use with discretion.

Mr. WEBB. We do.

Mr. EVINS. And for you to use your authority.

Maybe you do not need the statute amended.

Mr. THOMAS. I think that is a point right there.

Mr. OSTERTAG. Mr. Webb, you stated this morning that the Russians have been reluctant or have showed no inclination to join hands in this sharing.

Mr. WEBB. I said "very little."

Mr. OSTERTAG. Very little.

Mr. WEBB. Yes, sir.

Mr. OSTERTAG. On the basis of that, and on the point of cooperation, which is the language used in the statute, it would seem to me that in your discretion, until and unless you get a reasonable balance, you are not mandated by law to reveal such information.

NATURE AND VALUE OF INFORMATION RELEASED

Mr. THOMAS. Mr. Webb, let me interrupt right there.

Let us put in the record exactly what is the type of information we have been making public to the world. After all, we have not given the world any information that perhaps they could not find from listening up in the Press Gallery.

Dr. Seamans pointed out awhile ago that you have given no information whatsoever on your use of the military vehicle.

Dr. SEEMANS. Not without specific approval of the Department of Defense.

Mr. THOMAS. Other than the astronaut taking off and coming down. Perhaps they could have gotten that by——

Mr. WEBB. That is why I am so troubled by Mr. Jonas——

Mr. THOMAS. Just what information are you giving?

Mr. WEBB. On the Glenn flight there were 1,000 newspaper and TV men at Cape Canaveral.

Mr. THOMAS. They were there because you let them in. They could not have gotten in if you had not let them in?

Mr. JONAS. You misunderstand me. I am not talking about the past but I am talking about the next 5 or 10 years.

Mr. WEBB. What troubles me is that this Nation did gain tremendously from the way the Shepard flight and the Glenn flight were conducted. We gained tremendously as a nation and if you ask me to suggest a change in the law that would stop that benefit, then I would have to hesitate. This is my problem.

Mr. JONAS. I think the way the Nation gained was in having the shot in the open and not from any information you gave. I am talking about the information you are going to give as a result of these weather experiments and these other things you hope to develop.

REVISION TO "ACCESS TO INFORMATION" SECTION

Why could not this section be changed to say "unless the President deems it not in the best interests of the Nation?" Those words, or similar words, are used throughout our body of statutes. You do not have to base it entirely on national security unless the President deems it would not be in the national interest.

Mr. WEBB. Let me think about that. That would permit him to issue an order with respect to particular areas?

Mr. JONAS. He could delegate it to you to make a decision, I would think; but I think this section needs to be tightened up. I do not want to be misunderstood. I do not want to start sending up these satellites in secrecy. I want to cooperate, too, but I do not see much point in our developing all of the information you disclosed today that you hope to develop in the course of 10 years and revolutionize the world, and then turn it over to our potential enemies.

Mr. RHODES. Is it not possible that we used a different technique in our astronauts' flights than the Russians did? They have a technique which they may have perfected to a certain degree and because we released what we did, they can take their information and our information and come up with something far superior to anything either of us has done alone? We are not able to do that because we do not have their information available.

Mr. WEBB. We have given complete information about recovery which I think you are thinking about particularly?

Mr. RHODES. That is correct, and possibly control during flight.

Mr. WEBB. The question revolves around whether having this information and what we have released, they could come up with something far superior, but there is a large number of able people in the free world who could come up with something superior as a result of some development in some area of the free world that would not have occurred if we did not have wide dissemination of this information. There is the nub of the question right there—whether we can move fast enough.

Mr. RHODES. I gave you one hypothesis and you gave me one back.

Mr. WEBB. That is right. That is what would have to govern an amendment of the law.

EXCHANGE OF INFORMATION WITH THE SOVIETS

Mr. RHODES. How about the possibility of being a little tougher with the Russians and demanding a little more quid pro quo for this sort of thing?

Mr. WEBB. It seems to me that the President has been pretty tough with them in connection with the opening of negotiations. He said, "Show me," and he has sent Dr. Dryden and others to say, "If you mean it, fine. If so, in what way?"

He has made certain specific proposals they had to accept or reject.

Mr. OSTERTAG. That is fine and we should applaud that but until and unless they are inclined to give, then the question arises, are we not aiding and abetting them by being so liberal with these scientific developments insofar as outer space is concerned?

Mr. WEBB. You may be aiding and abetting, but on the other hand you may be keeping Germany, England, and France, and other nations from working closely with us and presenting the image of a nation ahead in science and technology over all of the world. Again, there are two sides to this coin.

Mr. RHODES. As far as the Russians are concerned, they would not give us a thing as long as they could be satisfied, which I think they can be, that eventually we will give what we know to them anyway.

Dr. SEAMANS. Off the record, please.

Mr. THOMAS. All right.

(Discussion off the record.)

EXCHANGE OF BASIC RESEARCH VS. TECHNOLOGICAL INFORMATION

Dr. NEWELL. I think it might be useful to distinguish here between two types of information. There is the basic research information, results of scientific investigation and there is the technological information, the results of development, of applied research. If you keep in mind that the basic research results are not really secrets, you might call them secrets of nature but they are available to everybody, then you can see, as history has shown, and I can give you examples, that you penalize yourself by trying to keep that secret.

Mr. THOMAS. That is the basic research?

Dr. NEWELL. That is the basic research. You gain more by bringing in as partners on your team the various countries who have the scientific minds around the world than you do by trying to keep the wraps on that.

In the other area, in the technological area, where you have results of development and so forth, these amount to inventions. They are secrets of man and those are the areas in which we can keep things under wraps and in fact, as I understand the NASA policy, for the most part we do keep under wraps the new technological things, especially those that have impact on military applications.

These are not the things that we reveal.

Mr. RHODES. Do the Russians reveal their findings on basic research?

Dr. NEWELL. Yes, sir, they do. We get them from their publications and also from their presentations of papers at the international symposia, like the symposia of the Committee on Space Research that will be held here at the end of this month.

I might also point out, in answer to a question you asked earlier, that in our international cooperative program with the United Kingdom, France, and other countries, and presumably with Russia, if this develops, one particular element always is introduced that the

results obtained by both sides will be published openly so that for what we produce we get something back.

Mr. OSTERTAG. You are speaking of basic research?

Dr. NEWELL. Basic research.

Mr. OSTERTAG. Taking it a few steps beyond that to applied research and ultimate development and an end product, then you share that with someone else, or everyone else and they would not have to go through the field of research from any standpoint.

They have the benefit of your research?

Mr. WEBB. May I say a word there?

What has happened, I believe, historically, is that simply having the reports without having the experiments, or having done the work or developing the apparatus, that leaves you without the know-how to make it work. It is the total of the knowledge plus the know-how that we are apt to gain when we fly every 60 or 90 days with a man.

The know-how we have in the X–15 program which gives us a tremendous advantage as a nation as against anybody who may have seen any of the unclassified reports on this project.

Mr. AMES. The X–15 data are classified even today.

Mr. OSTERTAG. That has military aspects, does it not?

Mr. AMES. No; that is civilian.

Mr. OSTERTAG. The X–15 is associated pretty closely?

Mr. AMES. One other case: All of the data compiled within our organization from industry and NASA sources that led to a conference of contractors on power a year ago were classified, dealing with the technology and the state of the art. We have advanced the state of the art since that time and that is still classified.

NATURE OF INFORMATION CLASSIFIED

Mr. THOMAS. Did not Dr. Newell put his finger on that very well? Basic research is open information and no one has a monopoly on it, but when you come down to applied research and when you develop things through research then that is where the secrecy begins in the Space Agency; is that correct?

You keep that secret?

Mr. WEBB. That is right.

Mr. JONAS. Not under section 303 unless it is classified.

Mr. WEBB. It is discretionary authority we exercise in joint consultation with the military.

Mr. SIEPERT. Mr. Jonas, Mr. Webb made a comment earlier saying that we do, of course, respect the classification of anything the military says is classified. The other side of that coin is that we generate within our own program a tremendous amount of information which could have military significance and which our people classify. We do not classify only that which the military tells us to put under security restrictions.

If we feel this has a potential military significance, our security authortiy is such to permit the Administrator to classify the material.

AFTERNOON SESSION

Mr. THOMAS. Dr. Seamans, did you have a statement you want to read?

General Statement of the Administrator

Dr. Seamans. Yes. I have Mr. Webb's statement I will read into the record.

Mr. Chairman and members, it is an honor to appear here today to present President Kennedy's recommendation for funds for the program of the National Aeronautics and Space Administration for the fiscal year 1963.

I would like to make a brief general statement. Dr. Seamans, the Associate Administrator and whom we consider NASA's general manager, and NASA's program directors are here today with me to go into the details of the program. I regret that Dr. Hugh L. Dryden, Deputy Administrator, is not here today. He is in Atlantic City, N.J., to address the joint session of the Federation of American Societies for Experimental Biology. This was a longstanding commitment.

REVISED BUDGET PRESENTATION

The budget this year is presented in a different form than previously. Under a policy of the President and the Bureau of the Budget, we have presented the budget for fiscal year 1963 under two titles—"Research, Development, and Operation," with the sum $2,968,278,000 requested, and "Construction of Facilities," with the sum of $818,998,000 requested.

The reason for departing from the previous breakdowns which involved the classification of salaries and expenses and the conventional budget nomenclature is that, under "Research, development, and operation," the salaries and expenses are related directly under the subtitles to the research and development work in progress.

The salaries and expense items are only for the purpose of carrying out these programs, and we believe the programmatic type of presentation gives the representatives of the people in the Congress a better opportunity to know what is involved in each of these programs.

MANNED SPACE FLIGHT

With respect to the program areas, the manned space flight program involves a request of $2,260 million under the title "Manned Space Flight." The manned space flight program is managed by Mr. D. Brainerd Holmes who is with us this morning. Under his direction, we have an ongoing program that will not only finish the Project Mercury three-orbit mission but will expand the program to what we call the 1-day mission. We will then proceed rapidly to a two-man spacecraft called GEMINI, which will fly on a TITAN, and with which we will conduct our initial flight work to develop the rendezvous technique. We will then proceed to the APOLLO three-man spacecraft which will fly on an ADVANCED SATURN. If, however, the rendezvous technique does not prove to be the most satisfactory means of proceeding on outward into space beyond the near-earth orbits, we will build the NOVA, which is, as you know, a giant rocket, approximately two-thirds as high as the Washington Monument and having a thrust of about 12-million pounds.

I mention this progression because very large sums are involved in the building of an advanced spacecraft such as the APOLLO and the advanced launch vehicles such as the ADVANCED SATURN. Therefore, as a matter of prudent management, and also as a matter of having continuous and more valuable space flights in near-earth orbits, we are beginning the GEMINI program which will permit two men to fly together, and will allow them to rendezvous with an AGENA stage in orbit. In addition, GEMINI will permit one man to fly with an instrumented chimpanzee or other animal and to fly with a bio-pack in which the experiments can be monitored in flight. This will make them more useful than they would otherwise be.

However, even more important, perhaps, than this, or certainly of equal importance, is that, as we execute the very large contracts to build the APOLLO spacecraft and the very large rockets, SATURN and NOVA, we will be proving out with the GEMINI project the rendezvous technique.

Ultimately, we hope to use two ADVANCED SATURNS to launch 400,000 pounds into a near-earth orbit, in two packages; the first will be a large engine, which will weight approximately 200,000 pounds and will be launched on the first ADVANCED SATURN.

As soon as this is in a stable orbit and we know precisely the orbit, we then expect to launch an APOLLO spacecraft with three men aboard. We expect to bring the engine and the manned command center together in orbit around the earth, join them, and use the large engine to proceed on outward to the moon.

This is the most inexpensive means of accomplishing the lunar landing. It also offers the potential of saving about 1 year's time.

I think it may be interesting to the committee to note that, in order to return approximately 6 tons to the earth, which is required to bring three men back into the earth's atmosphere, we must land 30 tons on the moon. In order to land 30 tons on the moon, we must launch approximately 200 tons or 400,000 pounds into a near-earth orbit.

These are tremendous undertakings. Nothing like them has ever been attempted by the engineering profession.

We are starting out on a program which I believe will accomplish these purposes, utilizing the most advanced technology that any nation has developed. The advance in the program supported by your committee last year has brought us to the point where we can project with confidence the success of this program.

I would like to say, however, that if the rendezvous technique of joining payloads launched by two ADVANCED SATURNS does not prove to be feasible, then we will proceed onward to the NOVA, perhaps slow up the expenditures on the SATURN that relate to rendezvous, and make a direct ascent to the moon on the NOVA.

The foundation for this program lies in advanced research and technology, in the study of the space sciences, and in the worldwide tracking and data acquisition network. I wish to touch on these briefly.

ADVANCED RESEARCH AND TECHNOLOGY

With respect to advanced research and technology, the request in this budget by President Kennedy is for $618.5 million. This is inclusive of the large expansion which we have in the nuclear technology

area, including not only the ROVER nuclear rocket but also the reactor-in-flight-test vehicle which we call RIFT and for which we will contract very shortly.

It includes substantial amounts of aeronautical work and it includes such advanced work as a mach 50 wind tunnel to build the research tools of the future.

We have had to solve the problems in the past which have brought us to the future. We have required very large research tools and a very advanced research engineering and technological foundation to accomplish them. We are now looking forward to and beginning in this budget the construction of the tools that will serve this Nation for the next 10 to 25 years in the same way our wind tunnels have served us in the recent past.

At present, Mr. Thomas Dixon is Acting Director of the Office of Advanced Research and Technology in addition to his serving as Deputy Associate Administrator. This Office is endeavoring to provide the tools for the immediate research and technological problems we must solve, to visualize and develop the concepts that will be required for the future, and to be as farsighted in aeronautics and space as we were in 1929 when we built the first wind tunnel.

SPACE SCIENCES PROGRAM

With respect to the space sciences program, the request in the budget before you is for $556 million. This includes instrumented examination of the space around the earth and observation of the sun's activity, which are very important in the earth-sun relationships. It includes instrumented landings on the moon, and such very advanced projects as the RANGER, the SURVEYOR, and a lunar orbiter, which will be used for mapping the surface of the moon. It also includes our interplanetary flights to learn more about the nearby planets. Dr. Homer Newell is the Director of the Office of Space Sciences.

TRACKING AND DATA ACQUISITION

The request for the tracking and data acquisition program is for $213.1 million.

Mr. Edmond Buckley, who is the Director of the Office of Tracking and Data Acquisition, is responsible for another very important area. Every space flight mission, whether rocket development, scientific satellite, space probe, or manned spacecraft, is undertaken to gather information. The critical element in getting such information back to the managers of the missions is the worldwide network of tracking and data acquisition stations. Our work in this area is important also in our relations with other nations because many of these tracking stations are manned by the nationals of other countries. In some cases the operation of foreign stations is paid for by other nations. These stations located around the world make a very great contribution to our civilian space program.

It is the strong desire of the President and I believe it was the strong expressed desire of this committee last year that we endeavor to move forward rapidly to utilize space science and technology for the benefit of all mankind and particularly where it had specific, important, im-

mediate application such as in the field of weather and in the field of communications.

METEOROLOGICAL SATELLITE PROGRAM

The primary objective of the meteorological satellite systems program is to establish and to improve a meteorological satellite capability for worldwide coverage, to provide the meteorologist with observations of atmospheric elements and storm systems. Information obtained by meteorological satellites will improve weather prediction procedures and will increase our understanding of atmospheric processes.

COMMUNICATIONS SATELLITES

Another application of the use of space which has great potential is in the field of worldwide communications. The objective of our communications satellite systems program is the pursuit of research and development to give maximum assurance of rapid and continuous scientific and technological progress toward operational global communications satellite systems.

I can report to you that we are making rapid progress in these fields. The work in these areas is under the supervision of Mr. Morton Stoller, the Director of the Office of Applications.

That concludes my brief statement. We are available to answer your questions.

Mr. THOMAS. A very nice statement.

Let's continue the academic discussion we started this morning. Gentlemen, are there any questions?

COST OF THE SPACE PROGRAM

Mr. EVINS. I just want to make the observation that President Kennedy appeared before the Congress in a special session with emphasis on space, and as I recall at that time he spoke of a program in the area of $7 billion. He said it is up to the Congress to make the decision. I have made mine, we are going to go to the moon.

Recently I read a report in one of the weekly news magazines indicating a program of $20 billion. This morning Mr. Webb speaks in the area of $35 billion.

Mr. OSTERTAG. Over 10 years.

Mr. EVINS. The President asked the Congress for $7 billion. Later on, you increased it to $20 billion. This gets back to what was asked this morning—how much is this program ultimately going to cost?

Dr. SEAMANS. You have to specify the interval of time. You have to specify the objectives that want to be achieved during this interval of time.

The figure of $20 billion is the figure we are using for the cost of placing a team of U.S. astronauts on the moon and returning them safely to earth. This does not include the cost of the unmanned scientific program, the applications program, the advance research and technology, and the aeronautics program.

The total program over the 10-year period is of the order of $35 billion. That was the program Mr. Webb was talking about this morning.

MAN-TO-THE-MOON FLIGHT

Mr. EVINS. The $20 billion you are speaking of now is what it will cost to put a team of two men on the moon at an indefinite date?

Dr. SEAMANS. It is not indefinite. Our objective is to put that team on the moon and bring them back in this decade.

In our detail planning, we are not shooting for the very last day of this decade. We have developed our plans to carry out this flight as soon as it is reasonable without undue risk, and without extravagant expenses.

Mr. EVINS. Certainly, the country is pleased with our successes thus far. We have come from behind until we now have had an astronaut in orbit. It has excited the country. The Nation's morale has been uplifted. I do not know if the Nation's morale is going to be uplifted when we speak in terms of $35 billion.

Mr. OSTERTAG. On this whole question Mr. Evins has raised about $35 billion and the ambitious increase in expenditures, there is no question, of course, that NASA is here to stay, that this whole field is going to be with us for many decades to come. Mr. Webb points out we are not engaged in a crash program but one that is supposed to move along with a certain degree of balance and reasonableness.

Yet, it is staggering to visualize a $35 billion program in a period of a few years. I tried to glean from the testimony here at what figure this might level off. Is that an indication, 10 years for $35 billion, in the years to come that is going to be more or less an average amount of resources we will be required to put into this type of effort and objective?

Dr. SEAMANS. Yes. As Mr. Webb indicated this morning, the program has increased very dramatically in previous years, practically doubling each year. Following 1963, we can expect a leveling off at something like $5 to $6 billion a year.

REVISED COST OF MANNED LUNAR FLIGHT WITHIN THE DECADE

Mr. OSTERTAG. $5 to $6 billion a year would run into $50 or $60 billion in 10 years.

Mr. WYATT. You have to put this number and the present $7 billion in the right context. The $35 billion estimate was for expenditures this decade, based around the President's statement he proposed a program that would land a man on the moon during this decade.

Mr. OSTERTAG. In other words, he was applying the $7 billion to the man on the moon?

Mr. WYATT. He was specifically applying $7 billion as an estimate of the increased expenditures this decade over the 10-year plan that was then proposed to the executive department which did not call for landing men on the moon until sometime well into the 1970's.

So the compression of the time scale from the early to mid-1970's down into the 1960's for the execution of the manned space flight program led to an estimate of an additional $7 billion during this decade. We had a long-range plan which roughly was estimated around $28 billion which would have provided for the development of the very large booster, the whole scientific program, the applications program, and would have provided for the early stages of manned space flight, but not culminating in landing men on the moon in the time period.

TEN-YEAR SPACE EXPENDITURE PLANS

Mr. OSTERTAG. Aside from the man to the moon program, and the $7 billion as proposed by he President, I am trying to obtain the broad picture of future responsibilities with regard to space, and yet the Administrator points out that $35 billion will be spent in 10 years, and you arrive at an annual figure of from $5 to $6 billion; therefore, is it not reasonable to say, on the basis of your estimates, this is going to run around $50 to $60 billion ultimately over a period of 10 years?

Dr. SEAMANS. This gets into the area Mr. Webb was discussing this morning, that is, the 10-year plan.

It is true if we level off at $5½ to $6 billion a year, several years from now, if you start adding up the total costs, it will come out to be $50 to $60 billion over a 10-year period.

Mr. OSTERTAG. That is the point I intended to make.

ECONOMIC BENEFITS OF SPACE PROGRAM

Mr. THOMAS. Dr. Seamans, the Administrator on two or three different occasions has talked about the economic benefits that will flow to the country as a result of this program.

Does anyone have any thoughts on that now?

Dr. SEAMANS. It is unfortunate Mr. Stoller is not here with us today because the responsibility for all types of application, both the direct application of the technology to satellites, as well as the indirect "spinoff" you are referring to, is his responsibility.

Mr. THOMAS. Is Mr. Stoller a scientist, an economist, or both?

Dr. SEAMANS. Mr. Stoller is a technical man by training. We are calling in as assistants and consultants to him people with industrial backgrounds as well as economists and individuals who can help in this kind of effort.

This is a great opportunity for the country. Basically what we can do in NASA is to serve as a catalytic agent.

It is our job to have the information available for those who can utilize it. We have to think through very carefully which areas can benefit most.

Mr. Webb this morning I believe referred to the biological and medical areas. We are doing considerable work with our astronauts by developing special instrumentation that permits us to record the internal activities of the astronauts at some distance from where they are located. It appears this type technology has application in our hospitals where it will be possible for a single person with a control center to monitor on a continuous basis the condition of a large number of patients.

This is just one of the examples that can be singled out where the space program can be of great benefit in other than space activity.

We are doing a great deal, as Mr. Webb mentioned this morning, in electronics and data processing. One of the tremendous undertakings that faces us is that of checking out a large launch vehicle down at Cape Canaveral, a vehicle which stands two-thirds as high as the Washington Monument. Each stage of that vehicle will be roughly the equivalent of one of our present-day weapon systems.

How are we going to know whether that vehicle is ready for flight? We must have special instruments. We must have special transmitting mechanisms, recorders, and devices which undoubtedly will have application to industrial processes in the future, as for example, in the oil industry.

I think another very significant area is that of power. As you know, we are working jointly with the Atomic Energy Commission on nuclear auxiliary power and other types of power for spacecraft. Undoubtedly in the future this will have important applications for mobile power stations that could be moved into very remote areas and set up on short notice.

SATELLITE COMMUNICATIONS PROGRAM

Mr. OSTERTAG. In this field of satellite communication on which legislation is currently pending before the Congress, it is probably that this will resolve itself into a joint Government-private enterprise operation, or development. Is there anything in your budget that is associated with that, and how do you arrive at it?

Dr. SEAMANS. In our R. & D. budget that you have in front of you, we have funds for an experimental program for both passive and active communication satellites, for both low to medium altitudes, as well as synchronous altitude satellites.

We have endeavored to lay out a program where we will cover the kind of technological development that will be required by whatever organization finally has the responsibility for operating commercial systems. We do not have any funds, however, for the actual operation of such a system.

Mr. OSTERTAG. You have not reached a point of operation?

Dr. SEAMANS. That is right.

Mr. OSTERTAG. What I am trying to determine, primarily, is how you estimate your requirements in view of the absence of any determination of what form or method this will take.

Dr. SEAMANS. We are looking at it from a technological and engineering standpoint.

The first question I mentioned was whether there should be a passive satellite or an active one. An active repeater is like a conventional repeater permitting you to transmit microwaves across the country only in this case it is in a satellite traveling overhead. We feel at this time it is important to have both kinds of R. & D., both on the passive and the active.

Mr. THOMAS. May I interrupt you?

Mr. Ostertag is trying to elicit from you that this is purely an R. & D. project, and the legislation he is referring to is how will the results of this experiment be divided up between industry and the public. So your job is not in the division after the scientific investigation in research has been completed. You are concerned with that first. The rights of the parties to use it is another matter.

Dr. SEAMANS. That is absolutely correct.

Another real question is whether these satellites should be at medium altitude, or synchronous altitude. In medium altitudes, from 2,000 to 4,000 miles, they move past a given point to the extent that it would take 30 to 40 satellites in orbit to give world coverage. At synchronous

altitude however, a few of these satellites will permit world coverage. However, orbit achievement is more difficult.

It is a tradeoff at this point, and no one can say today how to build an optimum system. We need more information on the technology associated with the placing of satellites in synchronous orbit and with the ground facilities for tranmitting and receiving the data. Many detailed technical problems have to be resolved, and the only way to resolve them is to put up an experimental system and operate it.

INDUSTRY PARTICIPATION IN SATELLITE COMMUNICATIONS PROGRAM

Mr. OSTERTAG. Industry, I understand, is prepared to invest hundreds of millions of dollars in this development. What I am trying to determine is that of NASA's part in this program in view of the various forms it might take, and you might well assume in the first instance that it will be a joint Government-private enterprise authority.

Dr. SEAMANS. Let's be sure it is clear. So far we are talking about a research and development program. It is true industry has offered to put some funds, not hundreds of millions, but some funds in the R. & D. As a matter of fact, the A.T. & T. is building a satellite with their own funds which we are going to launch for them, and they are going to pay for the boosters and for the tracking and data acquisition expenses on a cost basis. They are going to pay all the added costs of that project.

Mr. OSTERTAG. And you have determined how much you will require?

Dr. SEAMANS. In that particular case they are putting in the total cost of the project, and we have worked out an agreement with them such that the work they do on this particular project is made available to all commercial carriers. They do not get any special exclusive position as a result of this work.

PERSONNEL IN FOREIGN TRACKING STATIONS

Mr. OSTERTAG. In your statement you refer to the fact that the tracking stations are being manned, or will be, by nationals of foreign countries. Does that mean in all instances they will be wholly manned by the other countries, or will we manage them on a joint basis?

Dr. SEAMANS. I think in almost every case they are jointly manned. You have to, of course, take a look at the particular situation and the competence of the people in a particular location to make that kind of determination. Wherever we can, we are using foreign nationals.

Mr. Buckley can give you the figures. I think they run something like 50 percent at most of the stations.

Mr. BUCKLEY. I think that is right.

In certain countries such as Australia, they are able to run the whole station and we have one representative at the station.

In all stations, however, the janitors and the typists are foreign nationals. There are always some nationals at every station. About 50 percent would be a good figure.

NATURE OF FOREIGN TRACKING STATION AGREEMENTS

Mr. JONAS. You said this morning in all cases the host country furnishes the land for the tracking station.

What rights do we have in those stations? We put our equipment in there. Do we have a lease right? Do we have any particular specified period of time we can stay there?

Do we pay any rent?

Can they move us out on short notice?

What is the situation?

Mr. BUCKLEY. There are agreements that have been worked out through the State Department with the other countries, and these run to various dates and periods. They run for several years in general. The countries we go into usually have something to say on the length of the agreement. In some cases, it runs until there is a major change in government. We might be in there 4 years and then have to renew the agreement.

There is a time specified in the agreement, a notice that has to be given by the host country that will allow us to remove the equipment if they change their minds.

Mr. JONAS. In all countries, do we have the right to move our equipment if they turn us out?

Mr. BUCKLEY. Yes; it is so specified.

Mr. JONAS. The length of the period varies?

Mr. BUCKLEY. That is right.

Mr. JONAS. From country to country?

Mr. BUCKLEY. Yes.

Mr. JONAS. We have had some unfortunate experiences in military installations, I might interject. That is the reason I asked the question.

Mr. OSTERTAG. That is a point I had in mind. The military picture offers a similar problem, without a doubt.

CONSTRUCTION FUNDS FOR TRACKING PROGRAM IN 1963

I would like to inquire about this tracking station program. The managing of them is one thing, but the point is, you have an ambitious construction program which is in the making. Is that not the general picture?

In other words, this tracking station program is not wholly in existence, but just the primary program?

Dr. SEAMANS. It is true, in the research, development, and operation budget we have $158 million, and in the construction of facilities, some $54 million for tracking and data acquisition.

Mr. OSTERTAG. Acquisition. Construction of facilities?

Dr. SEAMANS. Yes. We have $54.7 million in this year's budget estimate for tracking data——

Mr. OSTERTAG. Under construction?

Dr. SEAMANS. That is correct.

Mr. OSTERTAG. Fifty-four million dollars would be the estimated figure of your program for the construction of tracking stations?

Dr. SEAMANS. Throughout the world.

NAVY PARTICIPATION IN TRACKING PROGRAM

Mr. OSTERTAG. Is it not true that the U.S. Navy, through its ship facilities, plays a part and serves in your tracking program?

Dr. SEAMANS. It is certainly true that not all the tracking facilities are on land. There are special ships that have been developed for certain of the tracking and telemetry functions. Generally, however, it is necessary to have a land facility because these antennas are very large. Right now, we have 84-foot antennas in South Africa and in Australia, as well as in our own country, and, in this budget submission, we indicate plans for 210-foot antennas—210 feet in diameter that could not be mounted on shipboard.

Mr. OSTERTAG. What I am trying to establish in connection with your tracking program and activities, and your stations, based on the fact the Navy does play a part and has ship facilities available for this purpose, does that mean the Navy assumes responsibility for that, or do you reimburse them for certain expenses in connection with the maintenance and operation of those ships?

Dr. SEAMANS. We reimburse them.

OVERALL OPERATION OF TRACKING PROGRAM

As a matter of fact, I would like to summarize the tracking data acquisition situation. There are some stations that have been funded by NASA around the world; there are some stations funded by the Department of Defense.

Mr. OSTERTAG. That is right.

Dr. SEAMANS. There are some actually owned and operated by foreign countries. There are some that are actually owned and operated by American industry, for example, A.T. & T.

We have a centralized office in NASA headquarters for tracking and data acquisition under Mr. Buckley because of this kind of management complexity. All of our mission-oriented program people go to Buckley to have their needs satisfied. We will find on a particular day we may use one set of stations, the next day for an entirely different mission we will be using some of the same stations all over again.

Mr. OSTERTAG. When we look at your budget insofar as tracking is concerned, we do not see the whole picture?

Dr. SEAMANS. No; you do not.

In the Department of Defense, under General Cooper, there is a similar office to the one we have under Mr. Buckley. Just recently, for example, Mr. Buckley has gone over to General Cooper and indicated our anticipated needs for ships for the coming 4 or 5 years. I do not recall the exact number but it is something like 8 or 10 ships. We have asked them whether they can satisfy our needs, or whether they feel it would be to the Nation's best interest if we outfit some of these ships. We are obviously looking for an opportunity to use a single ship, not just for NASA, but for NASA and the DOD.

REIMBURSEMENTS TO DOD FOR SPACE SUPPORT

Mr. OSTERTAG. But you do reimburse the Navy under certain circumstances and they at the same time fund for this operation?

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Dr. SEAMANS. There is no duplicate funding. I was referring to a special installation on a ship, to read out from one of our spacecraft when it involves a special kind of equipment.

Mr. BUCKLEY. These ships are out there for military purposes, too, and if our use of the ship does not require anything extra beyond what they already have for the military purpose, they do not require us to reimburse anything.

Mr. OSTERTAG. How do you arrive at that? It is a dual operation. How can you clearly determine what properly belongs to you by way of expense and responsibility, and what really belongs to the Navy. Is that not a difficult job?

Mr. BUCKLEY. It has not been so far. If a ship is in a certain part of the world, down off Panama, because of a southern firing out of PMR, it is pretty obvious why it is there. It is an aid to a firing. Therefore, it is pretty obvious to us we could use the ship without paying any added cost.

However, on that particular ship, if the type of telemetering we use in our spacecraft required some addition in electronics to the ship, we would be expected to give the Navy the equipment and place it on the ship. In other words, any special uses of a thing we would have to pay for.

Dr. SEAMANS. Our program is expanding to the point where we cannot just rely on the Department of Defense happening to have the available capacity. Down at the Atlantic Missile Range this coming year, we are going to reimburse the Department of Defense at a level of approximately $17 million for their support.

Mr. THOMAS. I had a figure in mind of $10 million.

Dr. SEAMANS. It is under launch operations development. It is from $1.8 to $21.5 million during this current year, $17 million of which will be used to reimburse the Department of Defense.

CONSULTANT SERVICES

Mr. JONAS. I have one general question before you get ready to go into the actual justifications.

The reason I want to bring this question up today is because I assume we will be in these hearings several days and the request I want to make will probably take overnight to compile the information.

I would like to have it tomorrow so in case some questions need to be asked about it, they can be asked before the hearings are over.

I would like to have a list of all consultants that the agency has employed since July 1, 1961, to date, the rate of their compensation, and the total amount paid them to date, and a very brief statement in addition to their names as to the general employment.

Dr. SEAMANS. We will be happy to bring that in tomorrow.

Mr. JONAS. Also, what they do for NASA.

Dr. SEAMANS. Fine.

Mr. JONAS. What you consult them about.

Dr. SEAMANS. Yes.

(The information was supplied to the committee.)

REVIEW OF CONTRACTS BY RENEGOTIATION BOARD

Mr. BOLAND. Are the contracts of NASA subject to review by the Renegotiation Board?

Mr. DEMBLING. Yes, they are.

Mr. BOLAND. By law?

Mr. DEMBLING. Yes. NASA is specifically covered by the Renegotiation Act.

Mr. BOLAND. It is written in the Renegotiation Act?

Mr. DEMBLING. Yes, sir.

EXAMINATION OF CONTRACTS

Mr. BOLAND. You are spending a lot of money, of course, with contractors. I would hope there would be within the framework of NASA a sufficient realization that there can be some tremendous profits made in this area, because it is a new area for many of the things you are requesting. I would hope this agency will not run into the same difficulty or the same problem that DOD is running into with reference to some of its contracts with major producers of some of the hardware that it requires. What is NASA doing to guard against this sort of thing?

Dr. SEAMANS. NASA's procurement procedures are under continuous examination by Mr. Webb, Dr. Dryden, and myself. We personally review every proposed procurement that is over $5 million. In these cases I have previously authorized the establishment of a formal evaluation board. Evaluation teams come in and present their findings to Mr. Webb, Dr. Dryden, and myself. At that time, decision is made to negotiate with one or another company, and the basis for the negotiation is outlined at that time. The Administrator is intimately involved in all of these large programs.

Mr. BOLAND. With respect to some of the contracts you have had with major manufacturers like McDonnell Aircraft, and McDonnell has been a very successful one——

Dr. SEAMANS. McDonnell, General Dynamics, North American, Lockheed.

CONTRACTOR PROFITS

Mr. BOLAND. Are the profits the contractors take out of a particular operation under review by NASA? Do they indicate to you what their profit is with respect to a specific contract that NASA might have with them?

Mr. SIEPERT. The fee from which their profit is derived is individually negotiated with respect to each contract at the time the work is undertaken or as soon as the scope of the contract has been definitized.

Mr. BOLAND. Are most of your contracts cost plus a fixed fee?

Mr. SIEPERT. Dollarwise, most of them are, yes, sir.

Mr. BOLAND. What is the fee?

Mr. SIEPERT. In the most recent period I have here, which would be the first 6 months of this fiscal year, the total fees averaged 6.56 percent of the estimated cost. The actual range has run from 3.41 to 9.35 percent.

CHINESE SPACE AND NUCLEAR ACTIVITIES

Mr. THOMAS. Doctor, just what are the Chinese doing in this field? We hear a lot of discussion over the radio and in newspaper articles about the rift between Russia and China. What information does the Space Agency have? I am sure you are in communication with other agencies of Government, including the Central Intelligence Agency. Are the Chinese making any move in the direction of space activities? Are they developing any boosters? Are they making any serious move in the direction of atomic energy?

Dr. SEAMANS. I am afraid I am really not qualified to answer that question. Of course, the Chinese pioneered in rockets many thousands of years ago. They do have some qualified people. I know Dr. Tsien, who used to be on the faculty of MIT and Caltech, is now actively working in China for the Communists. A few other former Chinese students here in this country in the missile and rocket field have been seen at conferences in Moscow. But I really have no information as to the true status of their developments in this area. I have heard, as you have, that they are pushing their nuclear effort, and that they undoubtedly will have a nuclear capability in the near future.

SPACE ACTIVITIES OF SOVIET SATELLITE COUNTRIES

Mr. THOMAS. What is a fair statement as to the comparability of our country and Russian satellite countries as to their activities in the entire field of space? Give us a clearcut picture on it.

Dr. SEAMANS. Perhaps really to do this we might call on a few people here, as, for example, Morris Tepper in the meteorological area. What do we find in our dealings with the Iron Curtain countries?

Dr. TEPPER. I am afraid I cannot shed very much substantive information on this, because they have been very quiet with regard to their activities in the meteorological satellite field. We know they are in a series of experiments now, and a meteorological satellite is among their experiments.

Mr. THOMAS. We have a pretty elaborate tracking system. Have we noticed any activity in this field?

Dr. TEPPER. I have no information that they have launched a meteorological satellite, and I suspect if they had, they would not have kept it a secret; they would have spoken about it.

Mr. THOMAS. They could not have kept it a secret with our tracking system, could they?

Dr. TEPPER. Presumably we would know that they had launched something, but what it contained would be another matter.

Dr. SEAMANS. From what I know, I think no satellites have been launched from any of the Communist countries excepting from Soviet Russia. Obviously, we have kept track of all of their launchings.

RECENT SOVIET SPACE ACTIVITY

Mr. THOMAS. Have the Russians launched any satellites since the astronaut?

Dr. SEAMANS. Yes, they have launched two satellites since then.

Mr. THOMAS. At what altitude did they travel? Did they go in orbit?

Dr. SEAMANS. Yes. They placed two satellites in earth orbit. The indication is that both of these contained scientific instrumentation.

Mr. THOMAS. How many satellites have they had in orbit during their entire existence in this field? Have you any information on that?

Dr. NEWELL. We can get some information on that. To go back to your previous question for just a moment, the Soviets have shown an increased activity of late in the area of scientific investigations, which they left relatively untouched for a number of years. We always wondered why, after launching Sputnik III, which was an excellent scientific satellite, they did not follow up on the discoveries they made with that satellite. We thought the reason was that the followup was not particularly spectacular and it was more in their interest to launch things to the moon and get their first. However, it appears—of course, this is subjective deduction and judgment—that the open conduct of our program and the broad spectrum of scientific satellites and researches that we have been doing are now proving embarrassing to the Soviets and that they are entering into this field of scientific satellites to fill in the gap in their program which is now becoming obviously a gap.

LIMITED ACTIVITY OF SOVIET SATELLITE COUNTRIES

As to the Soviet satellite countries—Poland, Czechoslovakia, and so on—their activities are extremely limited. Sometimes it looks to us as though maybe they are intentionally limited, that is, limited by the Soviets, although we do not know.

COMPARISON OF UNITED STATES AND SOVIET SPACE ACHIEVEMENTS

Mr. THOMAS. We are in the act of spending anywhere from $7 billion to $10 billion on large boosters right now to do just one thing, and that is to get that tremendous payload up. Russia has that thrust. They predominate in that field, as far as we are concerned, as of today.

Dr. NEWELL. Yes, sir.

Mr. THOMAS. It is our hope and aspiration in the next 3 or 4 years to come up with the NOVA, which will be—what—four or five times as powerful as anything they have. What are we doing now? What is our record of accomplishment as of today, compared with the Russians, in that space field?

Dr. NEWELL. If I may read a summary here, I will give two columns: U.S. satellites and U.S.S.R. satellites.

(The information referred to follows:)

Space flight summary

	Satellites		Space probes [1]	
	United States	U.S.S.R.	United States	U.S.S.R.
Launched	68	15	3	3
Recovered from orbit	15	5	----	----
Still in orbit	34	3	3	2
Transmitting	10	2	----	----
Manned	1	2	----	----
Lunar impact	----	----	0	1

[1] Sun orbit and lunar impacts

Mr. THOMAS. What evaluation has been made of the net results gained by the Soviets and the net results gained by the United States from the scientific point of view?

Dr. NEWELL. I think one can safely say that the net scientific results gained from the U.S. program far exceed the net gains so far of the U.S.S.R. program. This is attributable——

BENEFITS FROM U.S. SPACE PROGRAM

Mr. THOMAS. Spell out exactly what we have gained, what we have brought to light, what discoveries we have made, and what the Russians have done.

Dr. NEWELL. I will have to do this more or less at random.

Mr. THOMAS. Do it your own way.

RADIATION INVESTIGATIONS

Dr. NEWELL. We have, of course, discovered the radiation belt. This was discovered by James Van Allen of the State University of Iowa.

We followed up on that with additional discoveries about the relationship between the radiation belt and solar activity, on the one hand, and between the radiation belt and effects in the earth's atmosphere, on the other. These effects include, for example, auroral displays, interruptions of communications, even telephone communications. There are some hints that effects on weather are included, which our meteorological friends will be interested in following up in cooperation with the space science program.

Mr. THOMAS. Who is the meteorologist?

Dr. SEAMANS. Dr. Tepper.

Mr. THOMAS. We want to do a little business with you in a minute. Go ahead, Dr. Newell.

Dr. NEWELL. In addition to investigations of the radiation belt, the United States has done a tremendous amount in the investigation of radiations out beyond the radiation belt in interplanetary space. The most recent data indicate that these radiations may in fact be a much greater hazard to space flight than radiations in the radiation belt.

Mr. THOMAS. At what altitude are they?

Dr. NEWELL. This is out beyond 20 earth's radii. That would be 20 times 4,000—out beyond 80,000 miles away from the center of the earth.

These radiations include protons, hydrogen nuclei, ejected from the sun at the time of solar activity. On one occasion, during one solar storm, the total radiation that arrived in the vicinity of the earth's orbit amounted to something like 3,000 roentgens, whereas the total allowable dose to a man is estimated to be 100 roentgens. So, we have a problem here to face up to in the manned-space flight program.

INVESTIGATION OF EARTH'S ATMOSPHERE

Coming closer to home again, we have done a tremendous amount in the investigation of the earth's atmosphere, the ionosphere, for example. We have shown that the atmosphere at the top is quite differ-

ent from the atmosphere near the surface of the earth; that, for example, as you go up in altitude you change from normal sea level type atmospheric composition to one in which atomic oxygen predominates, say in the range from 200 to 1,000 kilometers; that if you go above this altitude, then the composition of the atmosphere begins to change from a predominantly atomic oxygen atmosphere to a predominantly helium-type atmosphere. The indications from our satellites are if you go still higher, say to 3,000 kilometers' altitude, you will find hydrogen becoming the dominant constitutent.

Mr. THOMAS. We are giving to the world all that good information we have discovered?

Dr. NEWELL. This is basic research. These are the facts of nature. In order to derive the benefit of the thinking of our scientific colleagues in Europe, Australia, Japan, and so on, we are publishing these data, and we have received back considerable benefit. For example, it was a German who discovered that there is a distinct relation between the 21 centimeter radio wave emission from the sun and upper atmosphere behavior.

U.S. FIRSTS IN SPACE SCIENCE

Mr. THOMAS. At this point, you may revise and extend your remarks and keep going with a detail of all of these "firsts" that we have made.

(The information requested follows:)

U.S. FIRSTS IN SPACE SCIENCES FIELD

1. Ultraviolet solar spectrum obtained from a rocket.
2. Picture of complete cloud system of a tropical storm from a rocket.
3. Penetration of equatorial ionospheric current sheets.
4. Detection of X-rays in high atmosphere from a rocket.
5. Detection of auroral particles in the high atmosphere from a rocket.
6. Discovery of the Van Allen radiation belt, discovery that it contained two dissimilar regions or belts, and discovery that the radiation belts form part of a large radiation region of nonuniform character.
7. Argus experiments showing entrapment of electrons in the earth's magnetic field.
8. Use of satellite orbits (VANGUARD I) to obtain precise geodetic information about the earth.
9. Discovery that the earth geoid is slightly pear shaped.
10. Proof that equator is slightly elliptical.
11. Longest range of communications (PIONEER V).
12. Use of alkali vapor cloud to study winds and motions in the upper atmosphere.
13. Use of passive reflectors to transmit radio signals (ECHO I).
14. Use of inflatable structures in space exploration (ECHO I and EXPLORER IX).
15. Use of exploding grenades to study the upper atmosphere.
16. Use of drag effect of high atmosphere on light satellites to obtain density of high atmosphere (ECHO I and EXPLORER IX).
17. Discovery of influence of solar events upon density of high atmosphere.
18. Determination of effect of solar radiation pressure upon satellite orbits (VANGUARD I and ECHO I).
19. Discovery of helium ion layer between atomic oxygen and hydrogen ion layers at upper limits of atmosphere (EXPLORER VIII).
20. Detection of cloud patterns, and ability to use satellite pictures of clouds in weather studies (TIROS).
21. Existence of magnetic damping in rotation and rolling of satellites.
22. Control of satellite orientation by use of earth's magnetic field (TIROS III).
23. Astronomical searching for UV sources from rockets.

24. Precisely pointed astronomical telescope, already tested in a rocket flight.
25. Discovery from UV rocket spectroscopy that stellar UV intensities do not agree with theory.
26. Satellite studies of VLF transmissions in ionosphere.
27. Study of galactic cosmic rays with gamma ray telescope (EXPLORER XI); discovery that results do not agree with one version of equilibrium theory of universe.
28. High definition photographs of surface granulation of sun from a balloon floating above most of earth's atmosphere.
29. Determination of astronomical unit from radar reflections from Venus.

Mr. THOMAS. If we had had a big booster like the Russians when we sent up 10, 40, or 50 or 75 pounds of material when they would send up anywhere from a ton to a ton and a half, would we have saved any money in the scientific investigation we have been doing?

Dr. NEWELL. Yes; I think we could have. It has become clear to us who have gone through the engineering that to send up large observatory-type satellites is much cheaper per experiment.

LACK OF ACTIVITY IN SOVIET SPACE PROGRAM

Mr. THOMAS. You indicated in the scientific world the Russians may be a little bit embarrassed at the progress we have made, and their lack of activity in certainly a realistic field. Do you think it might be too expensive for them to go into this field? What is the reason? They certainly have the scientific know-how.

Dr. NEWELL. They certainly have the scientific know-how. It is quite likely that the Russians have felt they could not undertake the broad program that we have undertaken.

COST OF UNMANNED SCIENTIFIC SPACE PROGRAM IN 1963

Mr. THOMAS. What would be a good opinion of the cost of this unmanned activity?

Dr. NEWELL. In Russia?

Mr. THOMAS. No, in the United States today.

Dr. NEWELL. We can add it up.

Dr SEAMANS. For example, we have estimated that our scientific program for 1963 will come to $543 million in research, development, and operation.

Mr. THOMAS. Let us break it down. You have for meteorology alone, in round figures, $51 million.

Dr. SEAMANS. That is correct.

Dr. THOMAS. For sounding rockets you have about $20 million.

Dr. SEAMANS. That is correct.

Mr. THOMAS. Now we are going to put in the big program, scientific satellites, $175 million.

Dr. NEWELL. Yes.

Mr. THOMAS. That is $275 million this year. This is all unmanned.

Dr. NEWELL. Yes.

Dr. SEAMANS. The $175 million, Mr. Chairman, is for 1963.

VALUE OF PROGRESS IN SPACE FIELD

Mr. THOMAS. What do you think we have spent to date? If we are ahead of Russia in this field, how much has it cost us and is it worth the money?

Dr. NEWELL. If you are asking me, the answer is "Yes; I think it is worth the money."

Mr. THOMAS. Where is it worth the money?

Dr. NEWELL. This is an investment in knowledge and ultimately will produce returns, not only in knowledge but in future applications.

Mr. THOMAS. Where will it produce that return?

Dr. NEWELL. We will get returns sometimes in predictable areas, such as in the use of satellites in communications; sometimes in unpredictable areas. Let me give you an example of the unpredictable type of return. When we went into the sounding rocket business, one of the areas we wanted to investigate in this country was the ionosphere. We went into this simply for the purpose of learning about what the ionosphere was like. In the course of these investigations, it became possible to predict the state of the ionosphere about 20 or 30 percent better than one could do it before the sounding rocket program. Translated into dollars, this means a savings of about $2 million per year in the communications business, because planned commercial schedules and other schedules could be kept more often. This, then, means that the ionospheric sounding rocket program pays for itself many times over.

Mr. THOMAS. Doctor, I have heard some criticism, I do not know whether valid or not, that we are sending up these sounding rockets and other small rockets just marking time until we can get SATURN I, SATURN II, or NOVA or one of the big boys up there. Is there any truth in that?

Dr. NEWELL. No.

Mr. THOMAS. Of course, the other half of that statement is that we are just spending money until we can get the big one, and then we will go right on upstairs.

Dr. NEWELL. No; I think not. From the scientific point of view——

Mr. THOMAS. We have led the world in the field, have we not? We are always bragging on Russia. How many satellites do we have up now, and how many does Russia have? Repeat that again for the record.

While you were gone, Mr. Administrator, the doctor told us how many satellites we have in orbit and how many the Russians have, and so forth; a very nice statement.

Go ahead, Doctor.

Dr. NEWELL. We have 34 in orbit, and the U.S.S.R. has 3 in orbit if we update this information with the 2 which have been launched recently.

Mr. RHODES. Do the silent satellites have any further use at all? Are we able to derive any use from their mere presence in the sky?

Dr. NEWELL. Yes; because simply by tracking them we can learn about upper air densities, about solar effects in the upper atmosphere, about the structure of the earth because of the effect of the earth's gravitational field on their orbit.

PROGRESS IN GUIDANCE SYSTEMS

Mr. RHODES. Mr. Chairman, I think also we have lost sight of one area in which we apparently are behind the Russians. That is the guidance system in spacecraft. We have not been able to hit the moon yet. They not only have hit it, but apparently looped it once and took

a picture of the back side. Have we done anything in this particular area to improve the state of our art?

Dr. SEAMANS. We had a RANGER shot, as you know, several months ago. Unfortunately, a beacon failed in the booster prior to cutoff, so we imparted too large a velocity to the spacecraft by a matter of, I guess, around 100 feet per second, and this was enough to miss the moon by approximately 20,000 miles. This was not actually a malfunction in the spacecraft. This was a reliability problem in the booster.

Mr. RHODES. They apparently have not had that problem, at least so far as we know. They may have had some failures that were not publicized, however. Have we any reason to believe this could have occurred?

Dr. SEAMANS. That they may have had failures we are not aware of?

Mr. RHODES. Yes.

Dr. SEAMANS. Of course, it is hard to tell exactly what their failures are, as you know. I would just as soon not comment on that.

Mr. RHODES. Do you want to comment any further on what we are doing to improve our own ability along these lines?

Dr. SEAMANS. We do have in the RANGER program onboard guidance which does permit us to change the landing position on the moon by approximately 1,000 miles. We did have a chance to utilize the equipment. Even though we could not hit the moon because the error was so large, we did check out that guidance equipment during the last RANGER shot, and it worked satisfactorily.

Mr. RHODES. Whatever happened to that Russian satellite that looped the moon and then came back toward the earth? Did it go into orbit around the earth?

Dr. NEWELL. You mean the Russian satellite that took a photograph of the back side of the moon?

Mr. RHODES. Yes.

Dr. NEWELL. It came back into the atmosphere eventually.

(Off the record.)

NEED FOR LARGE BOOSTER CAPABILITY

Dr. NEWELL. It might be of interest to note that here again, this question touches upon an area in which the Russians have an advantage because of their bigger booster. They are able to carry their weapons systems guidance system and make full use of it, whereas we have not yet been able to.

Mr. THOMAS. You mean if you get that big booster, Dr. Hauesserman has it made? Is that it?

Dr. NEWELL. He has it made.

Mr. RHODES. That is one thing you do not miniaturize too effectively.

GERMAN SCIENCE TEAM

Mr. OSTERTAG. How many of the original German team are associated with your organization at this time?

Dr. SEAMANS. I believe about 150 are working with Dr. von Braun.

Mr. SIEPERT. About a year ago we checked this, and of the original group, 126 are still at Huntsville. All but three or four are engaged in American rocketry. Three or four went back to the old country. Some of them retired.

RELATION OF OPERATION DEEPFREEZE TO SPACE WEATHER PROGRAM

Mr. THOMAS. Let me call attention to one other area in which the committee is interested. They are far more knowledgeable about it than I am. It was developed, I think, by our colleague from New York, Mr. Ostertag, who brought out the round figure of about $29 million as our expenditures at the South Pole, a carryover from the old Geophysical Year. The Russians are there with us. Apparently they are spending just as much as we are spending. We have been there now how long—8 or 9 years. What about it, Doctor? That is your field.

Mr. OSTERTAG. Project Deepfreeze.

Mr. THOMAS. How long are we going to stay there, and when are you folks going to make them obsolete?

Dr. TEPPER. I do not know that I am qualified to answer that question.

Mr. THOMAS. What is your best guess? I think you will come to an answer a whole lot quicker than they will, to give you the benefit of my nonexpert advice.

Dr. TEPPER. I would say that we will stay there as long as the objectives of our being there are to be completely realized.

Mr. THOMAS. What are they doing there that you are not doing a little higher up? You can measure the wind every day, 7 days out the week. What is the situation there?

Dr. NEWELL. I think you can say that right now we are in a period where measurements within the air mass that you are trying to study, measurements from above the air mass which, for the most part, are the infrared radiations from it and the cloud cover, have to be tied together. Hopefully, some day the measurements from above will in one way or another give us a handle on the others, because the others are so difficult to get.

Mr. THOMAS. You mean one complements the other, then.

Dr. NEWELL. At the present time, one complements the other and, hopefully, the satellite will actually be a substitute for much of the other, in time. At the present time, you cannot say that.

Mr. THOMAS. You are talking language we like to hear. What is your guess in time now?

Dr. NEWELL. That, I cannot guess. All I can say is that we are working just as hard as we can work and as we can get the researchers in the field to work.

OPERATION AND COORDINATION OF WEATHER RESEARCH PROGRAM

Mr. THOMAS. Of your entire expenditure, how much of it goes to weather?

Dr. SEAMANS. The $52 million is for meteorological satellites to carry out and complete the TIROS program, for the NIMBUS program, for the new polar satellite.

Mr. THOMAS. $52 million worth is all weather.

Dr. SEAMANS. That is correct. This is the meteorological satellite program.

Mr. THOMAS. We have $30 million in the National Science Foundation and the Navy, and then we have Dr. Reichelderfer——

Dr. SEAMANS. Dr. Reichelderfer has funds in his budget for an operational system.

Mr. THOMAS. Then we have the Army and Navy. This thing will pay for itself if we ever come up with some good weather information, will it not?

Dr. SEAMANS. We think it is already paying for itself. The TIROS is giving information which has been extremely valuable.

Mr. OSTERTAG. At no time have we been able to put together what everyone is contributing and doing in connection with this project. As the chairman points out, the Navy is involved, as well as the Science Foundation and others. The point is that this is an international agreement program; is it not?

Dr. SEAMANS. You are talking about our meteorological satellite program?

Mr. OSTERTAG. No; Deepfreeze.

Dr. SEAMANS. We have not gotten any of that in our budget. I am afraid I am not qualified to discuss that.

Mr. OSTERTAG. Are you aware of the fact that all of this exploring is carried on jointly with Russia and several other nations, and there is some question about what they are putting into it as compared with what we are doing?

Mr. WEBB. Our information which comes from the weather satellites flows right into the U.S. Weather Bureau and the military channels, and they have access to all of the information that comes from our satellites, but we are not trying to follow what they do with it with respect to the weather. Once we get the information back and pass it to them, we have done our job, except to develop better equipment so the next one will be better.

Mr. Chairman, I might say one thing which I believe very important to keep in mind. Whereas these weather satellites and cooperation with the Weather Bureau for an operational meteorological system come under our Applications Office, the work that Dr. Newell and his associates in space science are doing with respect to the ionosphere, for instance, and with respect to studies of the very high reaches of the earth's atmosphere and their study of the relationship between the earth and the sun, also yield a great deal of fundamental information which offers you the basis for, in a sense, an understanding of the cause of the weather, whereas many of these other factors are studying the result of those causes. This work in many ways gets at the causes better than any other work that we have going on anywhere in the Government.

I think that is a fair statement, is it not, Dr. Newell?

Dr. NEWELL. Yes.

Dr. SEAMANS. Our role in the meteorological satellite area is exactly equivalent to our role in communications satellites. We are carrying on advanced technological development, carrying on an experimental program to get the satellites in orbit in order to gather information. In the case of the meteorological program, however, the Weather Bureau will be the user. In time, they will be making use of the technology as well as the fundamental scientific information from our program. We will have the job of acting as their agent in actually providing the boosters and the spacecraft and the necessary ground control equipment so they will have this weather information available to them.

The Weather Bureau must coordinate the total weather forecasting for the country. It is not a NASA responsibility.

Mr. EVINS. Actually, instead of giving the Weather Bureau information, you get information from them. When you were launching the satellite, you kept waiting for what the Weather Bureau would report.

Mr. WEBB. We are users of their service, just as many other agencies.

Mr. THOMAS. I notice in your budget this year that you make a contribution to them of $20 million.

Dr. SEAMANS. They are actually funding the operational system and a large percentage of those funds will be transferred to our Agency for the implementation of the operational NIMBUS system.

There was a time when we actually did fund some research work. I believe we transferred funds to the Weather Bureau.

Mr. WYATT. Yes, we did.

Dr. SEAMANS. I do not believe we are doing that in 1962 or that it is planned for 1963.

Mr. THOMAS. $20 million worth. Look further, and it will make sense.

SOVIET LUNAR ACTIVITIES

Mr. EVINS. Tell us about the satellite that the Soviets hit the moon with. We know they took pictures from the back side, but they had another one that hit the moon.

Dr. SEAMANS. There were two separate flights. One actually impacted the moon, and the next one went around the back side of the moon and took pictures.

Mr. EVINS. We understand about the photograph. What about the one that hit the moon? Tell us about it off the record.

(Off the record.)

U.S. "FIRSTS" IN SPACE RESEARCH ACTIVITIES

INVESTIGATIONS OF THE RADIATION BELT

Mr. THOMAS. You have agreed to submit for the record a list of firsts that this country has achieved in the space field. Can you name some of them offhand? Dr. Newell, would you care to comment on that?

(NOTE: The list referred to appears on page 454.)

Dr. NEWELL. The PIONEER V, which was referred to, in addition to the technological "first" of maintaining contact out to 22½ million miles, was the first one to get a good measurement of the interplanetary magnetic field. This is of interest to scientists, but it is also of interest to the manned space flight, because it is involved in the problem of the radiation hazard. The magnetic fields will determine what happens to the radiation which comes from the sun.

Mr. YATES. This is the Van Allen Belt?

Dr. NEWELL. This is beyond the Van Allen Belt, out in interplanetary space.

In addition, I already mentioned that we made the first measurement in outer space. More recently, we made the first determination of the shape of the radiation belt and found something very interesting. The radiation belt is flattened in the direction toward the sun

so its edge is about at 10 earth's radii away from the center of the earth, whereas on the other side the edge appears to be about 20 earth's radii away from the center of the earth. So, it appears as though there is a constant wind blowing from the sun. What it is, we do not yet know, and we will have to look for this. Here again is a first, the determination of the shape of the radiation belt.

Mr. EVINS. This is a first, but you do not yet know what it is?

Dr. NEWELL. We know the shape of the radiation belt. We know that. Now, of course, we have another question.

SOLAR WIND

As always happens, once you discover something, another question comes up. Why is the radiation belt shaped that way? We think it is the solar wind, and we will go after that in some of the future shots. In the satellite which followed upon that——

Mr. RHODES. What is the solar wind? This is a term I have never heard before.

Dr. NEWELL. The sun is constantly emitting particles as well as light. These particles that are going away from the sun constitute the solar wind. They are probably electrons and protons (hydrogen nuclei) for the most part. Until the discovery of this flattening of the earth's radiation belt on one side and the blowing out on the other side, the so-called solar wind was simply something in the theorist's mind. Now it is a little more definite. After a few more measurements, we will pin down exactly what it is.

GAMMA RAY ASTRONOMY

Following that, we launched the satellite EXPLORER XI, which opened the field of gamma ray astronomy. As you know, one of the great advantages of the satellite and space probe is that you send equipment above the earth's atmosphere and look at what is going on out there in X-rays, gamma rays, ultraviolet light, infrared radiation, that do not get through the atmosphere to the surface of the earth.

In the gamma ray satellite, we made the first measurements of the extremely powerful photons, more powerful than X-rays, that are coming to us from outer space. The scientists are particularly interested in these measurements, because they have disproved one theory of the nature of the universe. The theorist can cross that one off and say that is not worth spending any time on, and he can concentrate on others.

Mr. THOMAS. You do not mean we are living on a flat world, do you?

Dr. NEWELL. No. It is still curved.

ULTRAVIOLET OBSERVATIONS

Another first is even more startling to the theorists. From observations of the sun from the ground, the theorists cooked up a description of what they thought the total radiation from the stars should be. Their whole theory of the nature of the radiation and the processes going on depends on that radiation curve being confirmed.

Goddard Space Flight Center sounding rocket flights have shown that that theory is wrong, because for very hot stars the experimental curve differs from the theoretical one by a factor of 30 out in the ultraviolet regions.

Now the theorists have to revise their theories. They have to come up with a new explanation of what is going on in the stellar atmosphere, all of which emphasizes the importance of making observations in the ultra-violet and other wave lengths that we do not see on the surface of the earth.

STUDIES OF THE SUN

Our latest first is the launching of a solar satellite, the Orbiting Solar Observatory I, which Mr. Webb referred to this morning, which is a tremendous advance in our study of the sun.

Mr. THOMAS. What was the payload?

Dr. NEWELL. That was a DELTA-type payload and its weight was about 450 pounds. It carries a stabilization system so that the instruments are pointed at the sun within a couple minutes of arc. This is very accurate pointing, and not only are the instruments pointed at the sun within a couple of minutes of arc, but every time the satellite goes behind the earth into the earth's shadow where it no longer sees the sun and comes out from the earth, that satellite has to reacquire the sun and reestablish that pointing. It is done over and over and over again perfectly.

Here is a technological first from which we expect to get many scientific firsts. The instrumentation covers the X-ray and gamma ray regions, and the sun will be studied in detail in these important wavelengths.

Mr. THOMAS. Where is that instrumentation done?

Dr. NEWELL. This instrumentation has been done in several places. The Goddard Space Flight Center, the University of Rochester, the University of California, Lawrence Radiation Laboratory, and the Ames Research Center. The Ball Bros. assembled the whole satellite. They were the engineers on the project.

IMPORTANCE OF INTERNATIONAL GEOPHYSICAL YEAR

Mr. YATES. Doctor, how important was the International Geophysical Year to your present program?

Dr. NEWELL. The International Geophysical Year gave our program a running start. The rocket work of the IGY and the years before, plus the satellite program of the IGY, and the thinking that went on in developing those programs, were used in NASA to move on to a national space program in space sciences.

Mr. YATES. Would you say that your present experimentation could be considered as a logical extension of the experience of IGY?

Dr. NEWELL. Yes, a logical extension. But at the present time we are going way beyond that. The first couple of years were years in which we used moderate-sized satellites which were immediate follow ons of the IGY satellites. In the last year we have moved to several-hundred-pound-sized satellites, and in the next couple of years we will go into the half-ton- to ton-and-a-half-sized satellites.

Mr. YATES. You are talking about specific instruments for carrying out certain knowledge, but I am talking about the purposes of the pro-

gram itself insofar as the International Geophysical Year sought to extend the frontiers of knowledge in the field of geophysics. This is a logical extension of that program, is it not?

Dr. NEWELL. This is a logical extension and broadening in that we are no longer confining ourselves to the earth as our object of study but to the earth in space, and to the study of the moon, the planets, and the stars.

NATURE OF COOPERATION UNDER IGY

Mr. YATES. What is the nature of the cooperation between the nations under the IGY?

Dr. NEWELL. The IGY cooperation fundamentally was a melding of individual programs with a sharing of some of the observational burden by previous agreement. The U.S. program was developed with the efforts of the other countries in mind so that the U.S. program covered areas that perhaps others were not going to cover. Each country paid for its own part of the IGY. There was a general agreement that the results would be published openly and made generally available through two mechanisms: publication in the journals and deposition in three world data centers.

Mr. YATES. Were those agreements fulfilled?

Dr. NEWELL. Those agreements were fulfilled even on the part of the Soviets. However, in the field of rocketry and satellites, as you well know, we could not always get the Soviets to agree to as broad a set agreements as we thought was desirable.

Mr. YATES. Because of the military nature of the vehicles?

Dr. NEWELL. That is correct.

Mr. YATES. Is it possible that the type of cooperation in the sharing of information that was present in the International Geophysical Year could be extended into the space area?

FUTURE COOPERATIVE AGREEMENTS

Dr. NEWELL. Yes, it is. I would say that in developing a cooperative program with the Russians, if this goes forward, that we want to be more hard nosed about the agreements on the exchange of data than we were in the case of the IGY.

Mr. YATES. In what respect?

Dr. NEWELL. To make sure that the agreements are broader and more complete.

Mr. YATES. Do you think this is possible?

Dr. NEWELL. I think we should bear down on it.

Mr. WEBB. This is the basis of our undertaking now.

Mr. YATES. I do not mean exactly whether the bearing down is possible, but is it possible to come to hard-nosed agreements with them?

Mr. WEBB. We do not know. We are in discussions with them now on the testing process to find out how serious they are about moving forward together in some of these fields. If they are serious, we are prepared and if not we are not prepared to do it.

Mr. YATES. Is there a broad field for nonmilitary cooperation?

Mr. WEBB. We think there is, depending on their willingness to make it a two-way street.

Mr. THOMAS. That is a pretty good answer.

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Mr. YATES. I agree.

There have been some studies made by a number of Congressmen with respect to procurement of defense work. It is found that there has been a general migration of such work in the Department of Defense to California and other areas. Is that true in the space field as well?

Mr. WEBB. There have been changes due to the nature of the work. You see, with an airplane, any manufacturer with an airport beside his plant can make the plane, fly it, and deliver it anywhere in the world, or anywhere it has the radius to fly to. In the case of the smaller boosters we have been using, let us say the ATLAS if you want to call it a small booster, you can fly that in a transport airplane specially equipped for that purpose. When you move one up to the larger boosters we now have in mind, such as the SATURN, even the smallest SATURN we have already flown on a test flight, you simply cannot do it without a tremendous undertaking. It might be possible to build a special airplane to fly the first and second stages of the SATURN C–1, but it would involve several hundred millions of dollars involving this particular airplane for that purpose.

Maybe some kind of a piggyback arrangement for this particular section on top of the airplane could be worked out but generally speaking, bearing in mind the fact that with the rendezvous technique we may have to assemble several of these very large boosters together so that if one fails we will have a backup for both the engine and the main section. Water transport has appeared to be the most logical and proper thing to do and in order to accomplish that and also to insure competition among the booster builders, we have taken over a vacant plant that was owned by the Government near the mouth of the Mississippi River at Michoud and have specified that the booster manufacturers must assemble the boosters there. They can do the engineering design and manufacture of the parts where they wish.

In the case of the larger SATURN, the Boeing Co. won competition to assemble that big booster at our Government assembly plant but they are going to make the parts in other places.

They will use the Wichita, Kans., plant they previously made B–52 parts in for a substantial part of the work, and also in order to insure competition and because you cannot move these big boosters at will, we have established a static test facility at Mississippi just 35 miles away so that the booster will be assembled in New Orleans, tested at the Mississippi test facility, and brought back for cleaning up and getting ready for flight and taken around to Cape Canaveral to fly. To the extent that this assembly operation and test operation takes place in a fairly concentrated area, there around the mouth of the Mississippi River, it will require some reorientation of the industry. In my view, this does not reduce the workload anywhere and actually the amount of increased work is so large that the total, even after you have relocated this assembly and test operation for the rest of the country, will be larger than it was.

We have tried very hard to go to a rapidly paced program utilizing those people who could prove through competition their ability to do the job. In some cases, we have, by quite deliberate decision, endeavored to maintain competition in certain fiields, like the building of liquid hydrogen engines. In this case we have negotiated contracts to keep at least two companies in the business of manufacturing liquid hydrogen engines to assure competition. In those cases, some of that work is done at their plants with Government facilities provided at the plant.

Mr. YATES. Has NASA made any studies which would indicate the sources of its procurement in terms of geographical location?

PERCENT OF FUNDS FOR CONTRACTS

Mr. WEBB. We are trying very hard to do this. Bear in mind that some 90 to 92 percent of these funds we are requesting from you, as estimated to go out under contracts to nongovernmental entities, we do have a breakdown by States on that.

SURVEYS ON LOCATION OF EXPENDITURES

We do have a breakdown that comes from the small business reporting system which shows the contracts that are given by prime contractors to small business, but in between there is a vast amount of subcontracting.

We have made some sample studies which show that in the case of one large contract to McDonnell Aircraft on the MERCURY, work was done in 37 States. This was about 10 percent of the NASA work, but it was listed on our records as having gone to a company in Missouri.

When you look at where the money was actually spent, it was spent in some 37 States.

We are working very hard right now to try and identify where this money goes through first- and second-tier subcontracts. This is a tremendous undertaking when you engage in between 90,000 and 100,000 procurement actions in a year, to have some kind of a system that shows where the money is actually spent.

Mr. YATES. Do your surveys show where most of the money is being spent? Is it spent on both coasts, around the center of the country, or where?

Mr. WEBB. I say, a great deal of the money goes into all sections.

For instance, Minnesota has a very active electronics industry and several companies there have substantial contracts.

Dr. SEAMANS. Honeywell has quite a number of contracts with us.

Mr. WEBB. Mostly contracts with our prime contractors?

Dr. SEAMANS. That is right.

Mr. WEBB. We have made the contract with the company and they, in turn, have gone to Minneapolis to find the Minneapolis Honeywell Co.

PRIME CONTRACTS OVER $25,000

Mr. YATES. How many prime contracts does NASA make in the course of a year?

Mr. WEBB. Prime contracts?

Mr. YATES. Yes.

Mr. WEBB. Forty-nine contracts let last year over $1 million.

Mr. SIEPERT. The business on the books at the present time shows that there are 148 active contracts which are over $1 million and some of them are for several hundreds of millions of dollars.

Mr. YATES. With whom are those contracts? Are those confidential contracts?

Mr. WEBB. No.

Mr. YATES. Is it possible to get a list of them?

Mr. SIEPERT. We have that information and we will be happy to supply it for the record.

The information we have is for all individual contracts awarded by NASA over $25,000. Smaller than that, the headquarters reports merely lump the contracts together.

Mr. YATES. That is all right.

(The information requested follows:)

All active NASA contracts over $25,000 as of Dec. 31, 1961

			Cumulative award (thousands)
Total			$1,679,386
Auburn, Ala			224
01	080	Auburn University, Auburn, Ala., research foundation	224
Birmingham, Ala			12,509
01	100	General Electric, Birmingham, Ala	58
01	100	Gulf Oil Corp., Birmingham, Ala	30
01	100	Hayes Aircraft Corp., Birmingham, Ala	11,912
01	100	Leeds & Northrup Co., Birmingham, Ala	26
01	100	Lynn-Dickerson Machinery, Birmingham, Ala	63
01	100	MG Electric & Equipment Co., Birmingham, Ala	25
01	100	Southern Research Institute, Birmingham, Ala	39
01	100	Union Carbide Corp., Birmingham, Ala., Linde Co.	312
01	100	Van Keuren Davis, Birmingham, Ala	44
Huntsville, Ala			140,236
01	310	Ampex Corp., Redwood City, Calif., data prod	228
01	310	Abrams Aerial Survey, Lansing, Mich	30
01	310	Arde Engineer, Huntsville, Ala., engineering	76
01	310	Addressograph Multig, Huntsville, Ala	26
01	310	Bolt Beranek Newman, Cambridge, Mass	60
01	310	Brown Engineering, Huntsville, Ala	10,941
01	310	Burgess A. E., Birmingham, Ala	108
01	310	Burroughs Corp., Atlanta, Ga	905
01	310	Chrysler Corp., Detroit, Mich	15,234
01	310	Coston Co., E. C., Birmingham, Ala	427
01	310	Eskew, H. L., & Sons, Birmingham, Ala	108
01	310	Electro Missil Facil, New York, N.Y	3,996
01	310	Federal Services, Atlanta, Ga	779
01	310	General Electric, Phoenix, Ariz., computer	3,543
01	310	Hayes Corp., Brimingham, Ala	1,494
01	310	International Business Machine, Huntsville, Ala	2,146
01	310	Inschos Mechanical Contractor, Birmingham, Ala	164

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Huntsville, Ala.—Continued			
01	310	Maintenance, Inc., Dothan, Ala	$495
01	310	Martin Co., Baltimore, Md	237
01	310	Minneapolis-Honeywell Reg., Huntsville, Ala	49
01	310	McWhirter Material, Atlanta, Ga	48
01	310	Management Services, Oak Ridge, Tenn	2,517
01	310	Murray Co., Atlanta, Ga	38
01	310	North American Aviation, Long Beach, Calif., Autonetics	97
01	310	Pearce & Gresham Co., Decatur, Ala	1,168
01	310	Redstone Machine & Tool, Huntsville, Ala	1,388
01	310	Reynolds Electric & Engineering, Freeport, Tex	482
01	310	Rust Engineering, Birmingham, Ala	3,784
01	310	Rocket City Air Act, Huntsville, Ala	190
01	310	Royal Mcbee Corp., Huntsville, Ala., data process	102
01	310	Southern Assoc. Eng., Huntsville, Ala	40
01	310	Spaco Mfg. Co., Huntsville, Ala	1,647
01	310	Sverdrup & Parcel, St. Louis, Mo	187
01	310	Snyder, M. F., & Co., Birmingham, Ala	38
01	310	Schrimsher, Jt. Const., Huntsville, Ala	866
01	310	Southern Acoustics, Birmingham, Ala	38
01	310	Space Craft, Inc., Huntsville, Ala	50
01	310	AF Systems Command, Washington, D.C	34,372
01	310	Army Engineers, Mobile, Ala	11,843
01	310	Army Ordnance, Huntsville, Ala., AOMC	40,190
01	310	Westinghouse Electric, Huntsville, Ala	25
01	310	Young & Johnson Co., Decatur, Ala	80
			105
Mobile, Ala			200
01	360	Army Engineers, Mobile, Ala	200
Montgomery, Ala			32
01	370	Sherlock Smith Adams, Montgomery, Ala	32
University, Ala			172
01	581	Alabama, University of, University, Ala	172
Scottsdale, Ariz			307
02	119	Motorola, Inc., Scottsdale, Ariz., mil electron	307
Tucson, Ariz			188
02	130	Arizona, University of, Tucson, Ariz	188
Warren, Ariz			12,534
02	140	Army Ordnance, Huntsville, Ala., missil commd	12,534
Little Rock, Ark			62
03	230	A.R. & T. Electronics, Little Rock, Ark	25
03	230	Arkansas, University of, Little Rock, Ark	37

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Anaheim, Calif			$1,715
04	020	Beckman Instruments, Anaheim, Calif	653
04	020	Hallamore Electron, Anaheim, Calif	287
04	020	Interstate Elect., Anaheim, Calif	250
04	020	Ling-Temco Electron, Anaheim, Calif, Ling Electro	300
04	020	Seigler Corp., Anaheim, Calif, Hallmore El	48
04	020	Task Corp., Anaheim, Calif	177
Azusa, Calif			16,246
04	040	Aerojet-General, Azusa, Calif	16,246
Berkeley, Calif			1,550
04	065	A & DC Control Co., Berkeley, Calif	51
04	065	California, University of, Berkeley, Calif	1,499
Burbank, Calif			292
04	085	Collins Radio Co., Newport Beach, Calif	25
04	085	Lockheed Aircraft, Burbank, Calif., Lock-Cal Co	203
04	085	Trio Tech Co., Burbank, Calif	64
Canoga Park, Calif			122,827
04	096	North American Aviation, Canoga Park, Calif. Rocketdyne	122,277
04	096	Space Technology Lab, Canoga Park, Calif	178
04	096	Thompson Ramo Wooldridge, Canoga Park, Calif	372
Covina, Calif			246
04	150	Aerojet General, Covina, Calif, Aetron	246
Culver City, Calif			2,321
04	155	Hughes Aircraft, Culver City, Calif	2,169
04	155	Micro Gee Products, Culver City, Calif	102
04	155	Solid State Radiat., Culver City, Calif	50
Davis, Calif			147
04	162	Navy, Bureau of Medicine, Washington, D.C	147
Downey, Calif			5,410
04	169	California Computer Prod., Downey, Calif	995
04	169	North American Aviation, Downey, Calif	4,415
Duarte, Calif			26
04	172	Ginannini Controls, Duarte, Calif	26
El Cajon, Calif			64
04	173	Cosmic Corp., El Cajon, Calif	64
El Centro, Calif			57
04	175	AF Systems Command, Andrews AFB, Washington, D.C	57

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			award (thousands) Cumulative
El Monte, Calif			$98
04	185	Atlantic Research Corp., El Monte, Calif	63
04	185	Team Corp., El Monte, Calif	35
El Segundo, Calif			85
04	190	Wyle Lab., El Segundo, Calif	85
Fullerton, Calif			355
04	230	Beckman Instruments, Fullerton, Calif	311
04	230	Electrac, Inc., Fullerton, Calif	44
Gardena, Calif			44
04	235	Telemetrics, Inc., Gardena, Calif	44
Glendale, Calif			541
04	245	Ford Motor Co., Glendale Calif., Aeronutronic	35
04	245	General Precision, Glendale, Calif., Librascope	413
04	245	Space Electronics, Glendale, Calif	93
Goldstone Lake, Calif			293
04	252	Robinson & Wilson, San Bernardino, Calif	293
Goleta, Calif			631
04	253	Santa Barbara Res. Cent., Goleta, Calif	631
Hawthorne, Calif			948
04	265	Gulton Industries, Hawthorne, Calif., Eng Magnetic	44
04	265	Northrop Aircraft, Hawthorne, Calif., Northrop	836
04	265	Servomechanisms, Inc., Hawthorne, Calif	68
Inglewood, Calif			96
04	310	Chicago Aerial Industries, Inglewood, Calif., PAC Optical	61
04	310	Linair Engineering, Inglewood, Calif	35
Lancaster, Calif			4,576
04	318	Santa Fe Engineering, Lancaster, Calif	36
04	318	AF Logistic Command, Wright-Patterson AFB, Ohio	3,200
04	318	AF Systems Command, Washington, D.C	1,340
Lompoc, Calif			737
04	345	Navy, Bureau of Yards and Docks, San Diego, Calif	737
Long Beach, Calif			825
04	350	Federal Mogul Bower, Long Beach, Calif., Arrowhead	795
04	350	North American Aviation, Long Beach, Calif., Autonet Prod	30
Los Alamitos, Calif			160
04	352	Federal Mogul Bower, Los Alamitos, Calif., Arrowhead	160

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Los Angeles, Calif			$217,036
04	355	Acoustica Associates, Los Angeles, Calif	51
04	355	AI Research Manufacturing, Los Angeles, Calif	30
04	355	Ampex Corp., Los Angeles, Calif., Instr. Prod	26
04	355	Arnoux Corp., Los Angeles, Calif	114
04	355	Aerospace Corp., Los Angeles, Calif	930
04	355	Bendix Corp., Hollywood, Calif	142
04	355	Douglas Aircraft, Santa Monica, Calif	3,052
04	355	Fenske, Fedrick Mill., Los Angeles, Calif	97
04	355	Minn.-Honeywell Reg., Minneapolis, Minn., Aeronautical	4,642
04	355	Minn. Mining & Manufacturing, Los Angeles, Calif., Mincom	410
04	355	Master Specialties, Los Angeles, Calif	47
04	355	Packard Bell Electric, Los Angeles, Calif	1,544
04	355	Parker Hannifin Corp., Los Angeles, Calif., Aircraft	734
04	355	Ralph M. Parsons, Los Angeles, Calif	300
04	355	Planning Res. Corp., Los Angeles, Calif	92
04	355	Rand Corp., Santa Monica, Calif	607
04	355	Southwestern Eng., Los Angeles, Calif	807
04	355	Space Technology Lab, Los Angeles, Calif	13,986
04	355	Spectrolab, Inc., North Hollywood, Cal	377
04	355	Statham Instruments, Los Angeles, Calif	111
04	355	Southern Calif. University, Los Angeles, Calif	104
04	355	Telecomputing Corp., Los Angeles, Calif., Whittaker	77
04	355	U.S. Steel Corp., Los Angeles, Calif., Cons. W. Steel	991
04	355	AF, Secretary of, Washington, D.C	7,500
04	355	AF Systems Command, Los Angeles, Calif., Space System	180,008
04	355	Army Engineers, Los Angeles, Calif	160
04	355	Wells Industries, North Hollywood, Calif	97
Malibu, Calif			2,753
04	373	Hughes Aircraft Co., Culver City, Calif., Research Lab	2,753
Manhattan Beach, Calif			56
04	375	U.S. Chemical Mill, Manhattan Beach, Cal	31
04	375	Chemical Milling, Manhattan Beach, Calif	25
Menlo Park, Calif			920
04	395	Stanford Res. Inst., Menlo Park, Calif	920
Monrovia, Calif			1,795
04	415	Consolidated Systems, Monrovia, Calif	141
04	415	Consolidated Systems, Monrovia, Calif	560
04	415	Edcliff Instruments, Monrovia, Calif	29
04	415	Marquardt Corp., Van Nuys, Calif	177
04	415	Telecomputing Corp., Monrovia, Calif., Adv. structur	458
04	415	Navy Research, ONR, Washington, D.C., Research lab	359
04	415	Zimney Corp., Monrovia, Calif	71

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Mountain View, Calif			$6,086
04	435	Beckman Systems, Inc., Fullerton, Calif., Systems Div	35
04	435	Blount Tears, Inc., Montgomery, Ala	861
04	435	Burroughs Corp., San Francisco, Calif., Equip system	50
04	435	Cortelyou & Cole, Inc., Palo Alto, Calif	94
04	435	California, University of, Berkeley, Calif	690
04	435	Comcor, Inc., Denver, Colo	96
04	435	Carroll, R. L., San Jose, Calif	65
04	435	Enviratron Co., Van Nuys, Calif	60
04	435	Internat. Business Machine, Washington, D.C	525
04	435	C. C. Moore, San Francisco, Calif	687
04	435	Serpa Shanrock Wenks, San Jose, Calif	28
04	435	Carl E. Swenson, San Jose, Calif	1,789
04	435	S & Q Construction, S. Francis., Calif	375
04	435	Union Carbide Corp., San Francisco, Calif., Linde Co	75
04	435	Westinghouse Elec., Sunnyvale, Calif	656
Napa, Calif			350
04	440	Kaiser Steel Corp., Napa, Calif	350
Newport Beach, Calif			174
04	455	Ford Motor Co., Newport Beach, Calif., Aeronutronic	101
04	455	Marquardt Corp., Van Nuys, Calif	73
Pacoima, Calif			41
04	503	Poly Industries, Pacoima, Calif	41
Palo Alto, Calif			1,478
04	510	Hewlett Packard, Rockville, Md	195
04	510	Lockheed Aircraft, Sunnyvale, Calif., Missile spa	36
04	510	Philco Corp., Palo Alto, Calif	500
04	510	Radiat at Stanford, Palo Alto, Calif	150
04	510	United Tech. Corp., Palo Alto, Calif	148
04	510	Varian Assoc., Palo Alto, Calif., Instrument	262
04	510	Vidya, Inc., Palo Alto, Calif	63
04	510	Watkins-Johnson Co., Palo Alto, Calif	124
Pasadena, Calif			261,153
04	515	Aerolab Develop Co., Pasadena, Calif	825
04	515	Calif. Inst. Tech., Pasadena, Calif	258,376
04	515	Consolid. Electrody, Columbus, Ohio, Anal & Contr	291
04	515	Electro Optical Syst. Pasadena, Calif	1,147
04	515	Giannini Controls, Washington, D.C., Tranducer	26
04	515	National Eng. Science, Pasadena, Calif	71
04	515	Resdel Engineering, Pasadena, Calif	206
04	515	Zimney Corp., Pasadena, Calif	211
Port Hueneme, Calif			914
04	553	Bur. of Weapons, Point Mugu, Calif., Missil range	914
Redlands, Calif			322
04	565	Grand Central Rocket, Redlands, Calif	322

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Redwood City, Calif			$1,147
04	575	Ampex Data Products, Villa Park, Ill	1,072
04	575	Western Scient. Instr., Redwood City, Calif	75
Ridgecrest, Calif			566
04	587	Navy Bur. Weapons, China Lake, Calif., test station	566
Sacramento, Calif			3,820
04	600	Aerojet General Corp., Sacramento, Calif., liq rock	3,820
San Carlos, Calif			66
04	630	Len Kurt Electric Co., San Carlos, Calif	28
04	630	Litton Industries, San Carlos, Calif., electro tube	38
San Diego, Calif			9,155
04	635	Electro Instruments, San Diego, Calif	49
04	635	General Dynamics, San Diego, Calif., gen atomics	8,097
04	635	Narmco Industries, San Diego, Calif	60
04	635	Ryan Areo. Co., San Diego, Calif	371
04	635	Ryan Electronics, San Diego, Calif	200
04	635	Solar Aircraft Co., San Diego, Calif	268
04	635	Navy Bur. Yard & Dock, San Diego, Calif	110
San Francisco, Calif			66
04	645	Columbia Electric, San Francisco, Calif	40
04	645	John Sardis and Assoc., San Francisco, Calif	26
San Gabriel, Calif			45
04	650	Clary Dynamics, San Gabriel, Calif	45
Santa Ana, Calif			1,549
04	690	Borg-Warner Corp., Santa Ana, Calif., controls	67
04	690	Collins Radio Co., Newport Beach, Calif	47
04	690	Electr. Eng. Corp., Santa Ana, Calif	78
04	690	Plasmadyne Corp., Santa Ana, Calif	1,357
Santa Barbara, Calif			111
04	695	Astro Res. Corp., Santa Barbara, Calif	111
Santa Monica, Calif			67,926
04	715	Douglas Aircraft, Santa Monica, Calif	67,385
04	715	Rand Corp., Santa Monica, Calif	541
South Pasadena, Calif			29
04	755	Microdot Inc., South Pasadena, Calif	29
Stanford, Calif			1,231
04	764	Leland Stanford Univ., Stanford, Calif	1,231

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Sunnyvale, Calif			$13,923
04	770	Lockheed Aircraft, Sunnyvale, Calif., Missil Space	802
04	770	United Technology, Calif	1,811
04	770	AF Systems Commd., Wash., D.C	11,310
Torrance, Calif			285
04	780	Cryo-Sonics Inc., Los Angeles, Calif	81
04	780	Clauser Tech. Corp., Torrance, Calif	146
04	780	Fuel Engnrng. Corp., Torrance, Calif	58
Van Nuys, Calif			535
04	811	Marquardt Corp., Van Nuys, Calif	335
04	811	Northrop Corp., Van Nuys, Calif., radioplane	87
04	811	Radio Corp. of Amer., Van Nuys, Calif	45
04	811	Waugh Engineering, Van Nuys, Calif	68
Vernon, Calif			159
04	812	Bechtel Corp., Vernon, Calif	159
Walnut Creek, Calif			250
04	819	Applied Radiation, Walnut Creek, Calif	171
04	819	M. B. Associates, Walnut Creek, Calif	79
Boulder, Colo			6,234
05	030	Ball Bros., Res. Corp., Boulder, Colo	4,210
05	030	Commerce Dept. of, Boulder, Colo., Bur Standard	1,269
05	030	Colorado, Univ. of, Boulder, Colo	755
Denver, Colo			685
05	080	Denver, Univ. of, Denver, Colo	307
05	080	Martin Co., Denver, Colo., Denver	205
05	080	Stanley Aviation, Denver, Colo	50
05	080	Telecomputing Corp., Denver, Colo., power source	94
05	080	Truck Equipment Co., Denver, Colo	29
Fort Collins, Colo			66
05	120	Colorado State Univ., Fort Collins, Colo	66
Bethel, Conn			40
06	030	Consolidated Control, Bethel, Conn	40
East Hartford, Conn			478
06	160	United Aircraft Corp., East Hartford, Conn., Pratt & Whitney	478
Greenwich, Conn			680
06	190	American Mach. & Foundry, Greenwich, Conn., AMF Atomics	680
Groton, Conn			377
06	250	General Dynamics, Groton, Conn., Elect. Boat	377

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Hartford, Conn			$16,121
06	280	United Aircraft, East Hartford, Conn., Pratt & Whitney	300
06	280	AF Systems Command, Washington, D.C	15,821
Middletown, Conn			1,310
06	340	Raymond Eng. Lab., Middletown, Conn	67
06	340	Raymond Eng. Lab., Middletown, Conn	654
06	340	United Aircraft, Middletown, Conn., Pratt & Whitney	589
New Haven, Conn			1,855
06	400	Textron Electronics, New Haven, Conn., M. B. Electron	898
06	400	Yale University, New Haven, Conn	957
Norwalk, Conn			222
06	460	Perkin-Elmer Corp., Norwalk, Conn	222
Stamford, Conn			981
06	640	Barnes Engineering, Stamford, Conn	422
06	640	Columbia Broadcasting, Stamford, Conn	176
06	640	Dunlap & Associates, Stamford, Conn	64
06	640	General Time Corp., Stamford, Conn	26
06	640	Manson Laboratories, Stamford, Conn	189
06	640	Army Signal Corps, Fort Monmouth, N.J., supply	104
Stratford, Conn			45
06	660	United Aircraft, Stratford, Conn., Sikorsky Air	45
Washington, D.C			116,165
08	001	Arinc Research Corp., Washington, D.C	301
08	001	Airtronics, Inc., Washington, D.C	289
08	001	Atomic Energy Commission, Washington, D.C	455
08	001	Armed Forces Institute of Pathology, Washington, D.C	27
08	001	Byron Motion Picture, Washington, D.C	200
08	001	Barretts Transfer, Mount Rainier, Md	34
08	001	Barry Industries, Washington, D.C	65
08	001	Catholic University, Washington, D.C	101
08	001	Commerce, Department of, Washington, D.C., Bureau of Standards	3,271
08	001	Computer Usage Co., Washington, D.C	54
08	001	Display House, Philadelphia, Pa	100
08	001	Darsel Graphic Art, Washington, D.C	94
08	001	Educational Services, Washington, D.C	61
08	001	Electro-Mechanical, Washington, D.C	28
08	001	George Washington University, Washington, D.C	121
08	001	General Services Administration, Washington, D.C	109
08	001	Interior, Department of, Washington, D.C., geological	555
08	001	Jacobs Transfer, Washington, D.C	130
08	001	Library of Congress, Washington, D.C	62
08	001	McKinsey & Co., Washington, D.C	151
08	001	Norwood Studios, Washington, D.C	202
08	001	National Academy of Sciences, Washington, D.C	375

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Washington, D.C.—Continued			
08	001	National Science Foundation, Washington,D.C	$95
08	001	National Academy of Sciences, Washington, D.C	85
08	001	Resources Research, Washington, D.C	141
08	001	Smithsonian Institute, Washington, D.C	10,566
08	001	Soc. Photo. Scien. & En., Washington, D.C	85
08	001	Air Force, Secretary of, Washington, D.C	430
08	001	AF Systems Command, Washington, D.C	55,506
08	001	Army, Secretary of, Washington, D.C., Signal Office	50
08	001	Army Engineers, Washington, D.C	50
08	001	Army Ordnance, Washington, D.C., Fuse Laboratory	400
08	001	Army Surgeon General, Washington, D.C	151
08	001	Army Chemical Corps, Washington, D.C	30
08	001	Navy, Secretary of, Washington, D.C., Comptroller	120
08	001	Navy Bureau of Medicine, Washington, D.C., School of Aviation Medicine	445
08	001	Navy Research ONR, Washington, D.C., Research Laboratory	33,504
08	001	Navy Bureau of Ships, Washington, D.C	2,300
08	001	Navy Bureau of Weapons, Washington, D.C	5,203
08	001	Navy Bureau of Personnel, Washington, D.C	111
08	001	Vitro Corp., Washington, D.C., Vitro Eng. Co	108
Cocoa, Fla			40,055
09	090	Air Products & Chem., Allentown, Pa	1,718
09	090	Blount Bros. Construc., Montgomery, Ala	3,348
09	090	Blount-Todd, Cape Canaveral, Fla., Brount Bros	419
09	090	Internat. Tel. & Tel., Paramus, N.J., Federal Elec	462
09	090	Noble Co., Oakland, Calif	315
09	090	AF Systems Command, Patrick AFB, Fla., AFMTC	833
09	090	Army Engineers, Jacksonville, Fla	32,914
09	090	Navy Bureau of Weapons, Patrick AFB, Fla., test unit	46
Gainesville, Fla			158
09	220	Florida, University of, Gainesville, Fla	158
Jacksonville, Fla			616
09	280	Army Engineers, Jacksonville, Fla	616
Melbourne, Fla			1,970
09	400	Radiation Inc., Melbourne, Fla	1,970
Miami, Fla			764
09	410	Cordis Corp., Miami, Fla	27
09	410	Milgo Electronics, Miami, Fla	737
Orlando, Fla			28,990
09	450	American Bosch Arma, Philadelphia, Pa., Tele-Dynamic	85
09	450	Connell, M. H., Miami, Fla	36
09	450	Dynatronics, Inc., Orlando, Fla	185
09	450	Hayes Corp., Birmingham, Ala., construction	685
09	450	Noble Co., Oakland, Calif	95
09	450	Radiation, Inc., Orlando, Fla	128
09	450	Southern Bell Tel. Co., Inc., Jacksonville, Fla	80
09	450	AF Secretary of, Wash., D.C	358
09	450	AF Systems Commd., Orlando, Fla., AFMTC	7058
09	450	AF Air Rescue Serv., Orlando AFB, Fla	500

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Orlando, Fla.—Continued			
09	450	Army Engineers, Jacksonville, Fla	$19,108
09	450	Navy Bur Weapons, Washington, D.C., PACIFIC M R	600
09	450	Navy Public & Print, Charlestown, S.C., 6 NAVAL DIST	72
Pensacola, Fla			1,882
09	510	Navy Bur Medicine, Pensacola, Fla., SCH AVIA MED	1,757
09	510	Navy Bur Weapons, Pensacola, Fla., FLEET SUPPT	125
St. Petersburg, Fla			1,097
09	580	Electronic Communica, St. Petersburg, Fla	376
09	580	Minneapolis Honey, St. Petersburg, Fla., AERONAUTICAL	721
Sarasota, Fla			969
09	600	Electro Mechan Res, Sarasota, Fla	969
Tallahassee, Fla			1,055
09	620	Florida State Univ, Tallahassee, Fla	1,055
West Palm Beach, Fla			37,981
09	670	Franklin Systems, W. Palm Beach, Fla	58
09	670	AF Systems Command, Wash. D.C	37,923
Winter Park, Fla			46
09	700	Consolidated Electro, Winter Park, Fla	46
Atlanta, Ga			306
10	040	Ampex Instrumen. Prod., Atlanta, Ga	78
10	040	Consolid. Electrodyn, Atlanta, Ga	62
10	040	Georgia Inst. of Tech., Atlanta, Ga	71
10	040	Xerox Corp., Atlanta, Ga	95
Marietta, Ga			3,681
10	480	Lockheed Aircraft, Marietta, Ga	3,681
Bartlett, Ill			618
12	030	Flexonics Corp., Bartlett, Ill., Calumet Hecl	618
Belleville, Ill			50
12	040	Mil. Air Trans. Serv., Scott AFB, Ill., MABAC ISB	50
Chicago, Ill			2,724
12	136	Armour Res. Found., Chicago, Ill	426
12	136	Booz Allen Appl. Res., Chicago, Ill	35
12	136	Chicago, Univ. of Chicago, Ill	1,069
12	136	Internat. Tel. & Tel., Chicago, Ill., ITT Kellogg	35
12	136	Muter Co., Chicago, Ill	26
12	136	Radiation Instrument, Chicago, Ill	181
12	136	Sciaky Bros., Inc., Chicago, Ill	218
12	136	Watland, Inc., Chicago, Ill	661
12	136	Zenith Radio Corp., Chicago, Ill	73

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Edwardsville, Ill			$40
12	216	Chromalloy Corp., Edwardsville, Ill., Propellex	40
Elgin, Ill			121
12	228	Elgin National Watch, Elgin, Ill., Elgin Micron	121
Evanston, Ill			136
12	240	Northwestern Univ., Evanston, Ill	136
Franklin Park, Ill			30
12	260	Cook Electric Co., Franklin Park, Ill., Nucledyne	30
Lebanon, Ill			30
12	418	Marmon Herrington Co., Lebanon, Ill	30
Maywood, Ill			3,578
12	472	Flexonics Corp., Maywood, Ill., Calumet Hecl	3,578
Metropolis, Ill			52
12	488	Allied Chemical Corp., New York, N.Y., Gen Chemical	52
Morton Grove, Ill			454
12	510	Cook Electric Co., Morton Grove, Ill., Cook Res Lab	454
North Lake, Ill			100
12	548	Radiation Instrument, North Lake, Ill	100
Richton Park, Ill			35
12	633	Materials Res Lab, Richton Park, Ill	35
Rockford, Ill			146
12	668	Ekstrom Carlson & Co., Rockford, Ill	146
Skokie, Ill			26
12	694	Ohmite Mfg Co., Skokie, Ill	26
Urbana, Ill			657
12	752	Illinois, Univ of, Urbana, Ill	657
Fort Wayne, Ind			588
13	280	Internat. Tel. & Tel., Fort Wayne, Ind., ITT Lab	556
13	280	Mobile Aerial Towers, Fort Wayne, Ind	32
Indianapolis, Ind			318
13	440	Baker, Hugh J., & Co., Indianapolis, Ind	119
13	440	General Motors Corp., Indianapolis, Ind., Allison	199

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Lafayette, Ind			$322
13	510	Midwest Applied Sci., Lafayette, Ind	57
13	510	Purdue Research Foundation, Lafayette, Ind	265
Michigan City, Ind			33
13	590	Thompson-Ramo-Wooldridge, Michigan City, Ind., Dage Div	33
Princeton, Ind			118
13	760	American Mach. Found., Princeton, Ind., Potter-Brumf	118
Davenport, Iowa			283
14	250	Bendix Corp., Davenport, Iowa, Pioneer Cent	283
Iowa City, Iowa			755
14	460	Iowa, University of, Iowa City, Iowa	755
Lexington, Ky			32
16	320	Kentucky, University of, Lexington, Ky	32
Baton Rouge, La			35
17	040	Allied Chemical Corp., Morristown, N.J., general chem	35
New Orleans, La			771
17	350	Gurtler, Hebert & Co., New Orleans, La	695
17	350	Army Ordnance, Birmingham, Ala	76
Aberdeen, Md			268
19	004	Army Ordnance, Washington, D.C	268
Annapolis, Md			25
19	010	Navy Research Onr, Annapolis, Md	25
Baltimore, Md			6,526
19	020	Aeronca Mfg. Corp., Baltimore, Md	66
19	020	Bendix Corp., Baltimore, Md., Bendix Radio	5,032
19	020	Greiner, J.E., Baltimore, Md	34
19	020	Johns Hopkins University, Baltimore, Md	339
19	020	Martin Co., Baltimore, Md	979
19	020	Westinghouse Elec., Huntsville, Ala	76
Beltsville, Md			32
19	025	Minneapolis-Honeywell Reg., Beltsville, Md	32
Bethesda, Md			202
19	026	Beckman Instruments, Bethesda, Md	44
19	026	Booz Allen Appl. Res., Chicago, Ill	69
19	026	Rodana Research Corp., Bethesda, Md	27
19	026	Navy Bureau of Medicine, Bethesda, Md., Med. Res. Inst	62

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Bladensburg, Md			$143
19	027	ACF Industries, Inc., Bladensburg, Md., ACF Electron	35
19	027	Milport Construct., Washington, D.C	45
19	027	Seaboard Papers, Inc., Bladensburg, Md	63
			143
Cockeysville, Md			70
19	054	Aircraft Armaments, Cockeysville, Md	70
College Park, Md			1,847
19	055	Litton Industries, College Park, Md	1,062
19	055	Maryland, University of, College Park, Md	785
Cumberland, Md			4,077
19	070	Navy Bureau of Weapons, Washington, D.C	4,077
Elkton, Md			661
19	110	Thiokol Chemical Corp., Elkton, Md., Elkton Div	661
Frederick, Md			30
19	120	Army Chemical Corps, Fort Detrick, Md., Biology Lab	30
Germantown, Md			1,708
19	133	Atomic Energy Commission, Germantown, Md	1,708
Glendale, Md			200
19	135	Commerce, Department of, Washington, D.C., Bureau of Public Roads	200
Greenbelt, Md			23,462
19	140	Agriculture, Department of, Beltsville, Md., research center	369
19	140	American Tel. & Tel., Washington, D.C., Government commun	2,138
19	140	Carlson, C. V., Co., Arlington, Va	55
19	140	General Services Administration, Washington, D.C	27
19	140	Humphreys & Harding, New York, N.Y	2,600
19	140	Federal Electric, Paramus, N.J	60
19	140	Kane Transfer Co., Washington, D.C	247
19	140	Minneapolis-Honeywell Reg., Hopkins, Minn	1,765
19	140	Norair Engr. Corp., Washington, D.C	7,229
19	140	Pitt Moines Steel, Baltimore, Md	75
19	140	Plant Security, Inc., Philadelphia, Pa	271
19	140	Radiation Service Co., Melbourne, Fla	31
19	140	United Eng. & Const., Philadelphia, Pa	3,400
19	140	United States Steel, Arlington, Va, American Steel Wire	43
19	140	Arthur Venneri Co., Washington, D.C	4,445
19	140	Voorhees Walker SSH, New York, N.Y	707

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Rockville, Md			$2,841
19	208	Defense Electronics, Rockville, Md	182
19	208	Engineering Physics, Rockville, Md	48
19	208	Foreign & Co., Inc., Rockville, Md	29
19	208	Interna. Bus. Mach., Rockville, Md., Federal Systems	676
19	208	Wash. Tech. Assoc., Inc., Rockville, Md	1,906
Shadyside, Md			25
10	213	Chesapeake Inst. Corp., Shadyside, Md	25
Silver Spring, Md			536
19	215	Computer Control, Silver Spring, Md	64
19	215	Freeman, J.J., Assoc., Silver Spring, Md	28
19	215	Gen. Electronic Lab., Silver Spring, Md	128
19	215	Operations Research, Silver Spring, Md	60
19	215	Schonstedt Eng. Co., Silver Spring, Md	55
19	215	Navy Bureau of Weapons, Silver Spring, Md., Ordnance Lab.	35
19	215	Vitro Corp., Silver Spring, Md., Vitro Elect	166
Timonium, Md			76
19	225	Electr. Communication, Timonium, Md., Research	76
Acton, Mass			33
20	010	McPherson Instr. Corp., Acton, Mass	33
Arlington, Mass			33
20	036	Conesco, Arlington, Mass	33
Ashland, Mass			288
20	038	Fenwal, Inc., Ashland, Mass	288
Bedford, Mass			2,094
20	058	Geophysics Corp. Amer., Bedford, Mass	2,049
20	058	AF Systems Command, Bedford, Mass., AFCRC	45
Boston, Mass			839
20	092	Allied Res. Assoc., Boston, Mass	157
20	092	American Meteorolog. Soc., Boston, Mass	50
20	092	Harbridge House, Inc., Boston, Mass	45
20	092	Jackson & Moreland, Boston, Mass	317
20	092	D. S. Kennedy, Cohasset, Mass	72
20	092	Minneapolis-Honeywell Reg., Boston, Mass	198
Burlington, Mass			669
20	113	Dynametrics Corp., Burlington, Mass	96
20	113	Goodrich Hi Voltage, Burlington, Mass	108
20	113	Hi Voltage Eng. Corp., Burlington, Mass	38
20	113	Radio Corp. of America, Burlington, Mass., Aero Space	400
20	113	Trans Sonics, Inc., Burlington, Mass	27

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Cambridge, Mass			$8,668
20	116	American Science Eng., Cambridge, Mass	274
20	116	Adcom, Inc., Cambridge, Mass	102
20	116	Bolt Beranek Newman, Cambridge, Mass	222
20	116	Dunn Engineering, Cambridge, Mass	114
20	116	Epsco, Inc., Cambridge, Mass	716
20	116	Harvard University, Cambridge, Mass	936
20	116	Hermes Electronics, Cambridge, Mass	304
20	116	Lexington Labs, Inc., Cambridge, Mass	71
20	116	Little, Arthur D., Cambridge, Mass	1,129
20	116	Massachusetts Institute of Technology, Cambridge, Mass	3,510
20	116	National Research Corp., Cambridge, Mass	295
20	116	United Research, Inc., Cambridge, Mass	48
20	116	United Research, Inc., Cambridge, Mass	25
20	116	Unilectron, Inc., Cambridge, Mass	38
20	116	AF Systems Command, Bedford, Mass., AFCRC	884
Cohasset, Mass			95
20	146	D. S. Kennedy Co., Cohasset, Mass	95
Everett, Mass			182
20	204	Avco-Everett Research Lab, Everett, Mass	182
Hingham, Mass			66
20	276	High Vacuum Equipment, Hingham, Mass	66
Lexington, Mass			3,084
20	340	Mass. Inst. Tech., Lexington, Mass	2,902
20	340	Trans Sonics, Inc., Lexington, Mass	182
Lowell, Mass			234
20	348	Standard Steel Corp., Lowell, Mass., Cambridge	234
Natick, Mass			376
20	428	Radio Corp. of America, Van Nuys, Calif., Missile surf	376
Newton, Mass			169
20	444	GPS Instrument Co., Newton, Mass	169
Newton Highlands, Mass			128
20	445	National Research Corp., Newton High, Mass., NRC equipment	128
Newtonville, Mass			128
20	446	Jarrell-Ash Co., Newtonville, Mass	128
North Andover, Mass			64
20	452	Western Electric, Inc., New York, N.Y., defense activity	64

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Pittsfield, Mass			$256
20	500	General Electric, Pittsfield, Mass	256
Somerville, Mass			36
20	568	International Dynamics, Somerville, Mass	36
Southbridge, Mass			56
20	576	American Optical Co., Pittsburgh, Pa., J. W. Fecker	56
Stoneham, Mass			33
20	588	Dynamics Research Corp., Stoneham, Mass	33
Waltham, Mass			885
20	632	Itek Corp., Waltham, Mass	607
20	632	Sanborn Co., Waltham, Mass	190
20	632	Tracelab, Inc., Waltham, Mass	88
Watertown, Mass			120
20	648	Army Ordnance, Rock Island, Ill., AOWC	120
Wayland, Mass			393
20	651	Raytheon Co., Wayland, Mass	393
Wellesley Hills, Mass			33
20	661	Minn.-Honeywell Reg., Wellesley Hills, Mass	33
West Concord, Mass			25
20	664	Grason-Stadler Co., West Concord, Mass	25
Westford, Mass			45
20	677	Liquid Metals, Inc., Westford, Mass	45
Wilmington, Mass			367
20	711	Avco Corp., Wilmington, Mass., R. & Adv. Dev	367
Worcester, Mass			31
20	732	Machinery Associates, Wynnewood, Pa	31
Ann Arbor, Mich			3,114
21	035	Applied Dynamics, Inc., Ann Arbor, Mich	48
21	035	Michigan, University of, Ann Arbor, Mich	3,066
Detroit, Mich			4,550
21	140	Chrysler Corp., Detroit, Mich., missile division	4,332
21	140	Henry Ford Hospital, Detroit, Mich	91
21	140	Vickers, Inc., Detroit, Mich	127

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Holland, Mich			$33
21	280	Conrad, Inc., Holland, Mich	33
Pinconning, Mich			40
21	482	Magline, Inc., Pinconning, Mich	40
Pontiac, Mich			1,313
21	495	Progress Welder Mach., Pontiac, Mich	1,313
Southfield, Mich			32
21	577	Acromag, Inc., Southfield, Mich	32
Warren, Mich			491
21	608	Cadillac Gage Co., Warren, Mich	381
21	608	Army Ordnance, Detroit, Mich	110
Weston, Mich			66
21	611	Staffer Chemical Co., New York, N.Y.	66
Wyandotte, Mich			43
21	615	Wyandotte Chemical Corp., Wyandotte, Mich	43
East Grand Forks, Minn			167
22	180	Ulvedal Construct. Co., Grand Forks, N.D	167
Hopkins, Minn			62
22	300	Minn.-Honeywell Reg., Hopkins, Minn., Ordnance	62
Minneapolis, Minn			2,366
22	400	Electric Machinery, Minneapolis, Minn	31
22	400	General Mills, Inc., Minneapolis, Minn., Mechanical	742
22	400	Minn. Honeywell Reg., Minneapolis, Minn	420
22	400	Minnesota, Univ. of, Minneapolis, Minn	1,133
22	400	Navy Research ONR, Washington, D.C., Air Branch	40
Northfield, Minn			663
22	470	G. T. Schjeldahl Co., Northfield, Minn	628
22	470	Navy Bur. Weapons, Washington, D.C	35
St. Paul, Minn			745
22	590	Gould-National Batt., St. Paul, Minn	99
22	590	Minn. Mining & Mfg., St. Paul, Minn	597
22	590	Sperry Rand Corp., St. Paul, Minn., Rand Univac	49
State College, Miss			55
23	415	Miss. State Univ., State College Miss	55

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Joplin, Mo			$102
24	410	Eagle-Picher Co., Joplin, Mo., Chem. metals	102
Kansas City, Mo			680
24	420	Midwest Res. Inst., Kansas City, Mo	680
St. Louis, Mo			138,427
24	730	McDonnell Air Corp., St. Louis, Mo	137,938
24	730	Sverdrup & Parcel, St. Louis, Mo	327
24	730	Navy Bur. of Weapons, St. Louis, Mo	65
24	730	Washington Univ., Saint Louis, Mo	97
Ely, Nev			281
27	020	Bendix Corp., Owing Mills, Md., Bendix Radio	281
Reno, Nev			7,444
27	040	Atomic Energy Comm., Wash., D.C	7,444
Durham, N.H			164
28	055	New Hamp., Univ. of, Durham, N.H	164
Nashua, N.H			100
28	140	Matrix R. & Dev. Corp., Nashua, N.H	100
Belmar, N.J			2,961
29	030	Army Secretary of, Washington, D.C., R & D	2,961
Camden, N.J			4,304
29	105	Radio Corp. of Amer., Camden, N.J	4,111
29	105	Navy Bur. Weapons, Washington, D.C	193
Denville, N.J			179
29	159	Thiokol Chemical, Denville, N.J., React motors	179
Harrison, N.J			40
29	305	Radio Corp. of Amer., Harrison, N.J., Elect tube	40
Hoboken, N.J			55
29	340	Condenser Ser. & Engi., Hoboken, N.J	27
29	340	Stevens Inst. Tech., Hoboken, N.J	28
Holmdale, N.J			172
29	343	Western Electric Co., New York, N.Y	172
Lakehurst, N.J			93
29	366	Navy-General Stores, Philadelphia, Pa	93

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Little Falls, N.J.			$90
29	387	General Precision, Little Falls, N.J.	90
Long Branch, N.J.			3,133
29	400	Electronic Assoc., Long Branch, N.J.	3,133
Metuchen, N.J.			348
29	445	Gulton Indust. Inc., Metuchen, N.J.	255
29	445	Lockheed Electronics, Metuchen, N.J., Info technol.	93
Moorestown, N.J.			2,999
29	478	Radio Corp. of Amer., Moorestown, N.J.	30
29	478	Navy Bur. Weapons, Washington, D.C.	2,969
Murray Hill, N.J.			76
29	482	Air Reduction Co., Murray Hill, N.J.	76
Newark, N.J.			233
29	500	Arde-Portland, Inc., Newark, N.J.	93
29	500	Cyro-Sonics Inc., Los Angeles, Calif.	90
29	500	Steel & Alloy Tank, Newark, N.J.	50
Nutley, N.J.			47
29	535	Internat. Tel. & Tel., Nutley, N.J., Federal lab.	47
Palisades Park, N.J.			411
29	565	Isomet Corp., Palisades Park, N.J.	411
Paramus, N.J.			102
29	575	ACF Industries, Inc., Paramus, N.J., ACF Electron.	36
29	575	Arde Associate, Paramus, N.J.	66
Phillipsburg, N.J.			28
29	615	Ingersoll Rand Co., San Francisco, Calif.	28
Plainfield, N.J.			141
29	625	Thermionic Products, Plainfield, N.J.	141
Princeton, N.J.			12,050
29	640	Electro-Mechanical, Washington, D.C.	81
29	640	Princeton Univ., Princeton, N.J.	1,423
29	640	Radio Corp. of Amer., Princeton, N.J., Astro-Electr.	10,428
29	640	Navy Bur. Weapons, Washington, D.C.	120
Red Bank, N.J.			37
29	665	Army Signal Corps, Fort Monmouth, N.J., R & D Center	37

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Teterboro, N.J.			$791
29	771	Bendix Corp., Teterboro, N.J., Eclipse-Pion	791
Trenton, N.J			226
29	780	Gulton Industries, Trenton, N.J., Ortholog	226
Union, N.J			68
29	785	Tenney Engineering, Union, N.J	68
West Long Branch, N.J			89
29	833	Electronic Assoc., Long Branch, N.J	89
Alamogordo, N. Mex			350
30	010	Army Ordnance, Redstone Arsenal, Ala., Missil Commd	350
Albuquerque, N. Mex			397
30	020	C. G. Electronics, Albquerque, N.M	75
30	020	New Mexico, Univ. of, Albuquerque, N.M	67
30	020	AF Systems Command, Kirtland AFB, N.M., AFSWC	255
Las Cruces, N. Mex			44
30	120	New Mexico State Uni., Las Cruces, N.M	44
University Park, N. Mex			944
30	223	N.M. State Univ., A&M, University Park, N.M	944
Albany, N.Y			48
31	004	Dudley Observatory, Albany, N.Y	48
Bethpage, N.Y			21,252
31	043	Grumman Aircraft, Bethpage, N.Y	21,252
Buffalo, N.Y			1,331
31	060	Bell Aerosystems Cor., Buffalo, N.Y., Bell Aerosys	99
31	060	Cornell Aero Lab, Buffalo, N.Y	1,194
31	060	Westinghouse Elec., Cleveland, Ohio	38
Dunkirk, N.Y			706
31	144	Alco Products, Inc., Atlanta, Ga	582
31	144	Pritchard, J. F. & Co., Kansas City, Mo	124
East Aurora, N.Y			180
31	148	Moog Servocontrols, East Aurora, N.Y	180
Elmhurst, N.Y			700
31	166	Kollsman Instrument, Elmhurst, N.Y	700

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Elmsford, N.Y.			$99
31	176	Sonotone Corp., Elmsford, N.Y.	99
Farmingdale, N.Y.			1,931
31	192	Republic Aviation, Farmingdale, N.Y.	1,931
Flushing, N.Y.			153
31	198	Filtron Co., Inc., Flushing, N.Y.	108
31	198	Warner & Swasey Co., Flushing, N.Y., Control Inst.	45
Garden City, N.Y.			284
31	224	American Bosch Arma., Garden City, N.Y., Arma. Div.	37
31	224	General Bronze Elect., Garden City, N.Y.	162
31	224	Powertrn Ultransonic, Garden City, N.Y.	35
31	224	Reeves Instrument, Garden City, N.Y.	50
Great Neck, N.Y.			86
31	260	Sperry Rand Corp., Great Neck, N.Y., Sperry Gyro	86
Hudson Falls, N.Y.			190
31	316	General Electric, Newport News, Va.	190
Ithaca, N.Y.			297
31	332	Cornell University, Itacha, N.Y.	297
Jamaica, N.Y.			64
31	334	Genarco, Inc., Jamaica, N.Y.	25
31	334	St. Johns University, Jamaica, N.Y.	39
Jamestown, N.Y.			102
31	336	Marlin Rockwell Corp., Jamestown, N.Y.	102
Kew Gardens, N.Y.			34
31	349	Roters, Herbert C., Kew Gardens, N.Y.	34
Liverpool, N.Y.			31
31	392	General Electric, Liverpool, N.Y.	31
Long Island City, N.Y.			180
31	401	Exhibit Craft, Inc., Long Island City, N.Y.	30
31	401	Ford Instrument Co., Long Island, N.Y.	49
31	401	Maurer, Inc., J. A., Long Island, N.Y.	38
31	401	Radiation Appl., Inc., Long Island City, N.Y.	63
Mineola, N.Y.			85
31	444	Acoustica Associates; Mineola, N.Y.	85
New Hyde Park, N.Y.			176
31	468	Simmonds Precision, Tarrytown, N.Y.	176

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
New York, N.Y.			$72,214
31	476	ACR Electronics Corp., New York City, N.Y.	119
31	476	Columbia University, New York, N.Y.	623
31	476	Cutler Hammer, Inc., Deer Park, N.Y., Airborne	1,680
31	476	Computer Application, New York, N.Y.	1,322
31	476	Grumman Aircraft, New York, N.Y.	29
31	476	Irco Corp., New York, N.Y.	45
31	476	International Business Machines, Washington, D.C.	135
31	476	Ivel Construction, Brooklyn, N.Y.	74
31	476	Lionel Electron Lab., Brooklyn, N.Y.	27
31	476	New York University, New York, N.Y.	730
31	476	Reeves Instrument, Long Island, N.Y.	27
31	476	Sperry Rand Corp., Long Island, N.Y., gyroscope	89
31	476	Teleprompter Corp., New York, N.Y.	57
31	476	AF Europe, USAFE, New York, N.Y.	287
31	476	Army, Europe, New York, N.Y.	75
31	476	Army Signal Corps, Fort Monmouth, N.J., R & D Lab.	150
31	476	Vitro Corp. of America, New York, N.Y., Vitro Eng.	722
31	476	Voorhees Walker Ssh, New York, N.Y.	135
31	476	Western Electric, New York, N.Y., defense proj.	65,888
Niagara Falls, N.Y.			1,435
31	512	Bel Aerospace Corp., Buffalo, N.Y.	1,435
North Tonawanda, N.Y.			27
31	524	Frank Parsons Paper, Washington, D.C.	27
Port Washington			43
31	606	Filtors, Inc., Port Washington, N.Y.	43
Rochester, N.Y.			1,003
31	620	Consolidated Vacuum, Rochester, N.Y.	45
31	620	Eastman Kodak Co., Rochester, N.Y.	50
31	620	Rochester, University of Rochester, N.Y., river campus	801
31	620	Wilmot Castle Co., Rochester, N.Y.	107
Rome, N.Y.			25
31	628	Rome Cable Corp., Rome, N.Y.	25
Schenectady, N.Y.			1,055
31	660	General Electric, Cincinnati, Ohio, rocket eng.	1,055
Sherburne, N.Y.			112
31	674	Tech Appliance Corp., Sherburne, N.Y.	112
Sidney, N.Y.			630
31	676	Bendix Corp., Sidney, N.Y., Scintilla	630
Silver Creek, N.Y.			45
31	680	Newbrook Machine, Silver Creek, N.Y.	45

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Syracuse, N.Y.			$608
31	712	General Electric Co., Syracuse, N.Y., def electron	528
31	712	Syracuse University, Syracuse, N.Y., research ins	80
Syosset, N.Y.			47
31	714	Technical Res. Group, Syosset, N.Y.	47
Troy, N.Y.			791
31	728	Rensselaer Polytechnic Institute, Troy, N.Y.	791
Westbury, N.Y.			254
31	800	Radiation Dynamics, Waterbury, Conn	254
White Plains, N.Y.			607
31	808	Nuclear Devel. Amer., White Plains, N.Y.	607
Yonkers, N.Y.			28
31	828	Fairchild Camera, Yonkers, N.Y.	28
Ashville, N.C.			70
32	030	Commerce, Department of, Ashville, N.C., records cntr	70
Chapel Hill, N.C.			95
32	100	North Carolina University, Chapel Hill, N.C.	95
Charlotte, N.C.			36
32	110	Douglas Aircraft Co., Charlotte, N.C., Charlotte	36
Coquina Beach, N.C.			44
32	135	Cieszko, Edward J., Havelock, N.C.	44
Durham, N.C.			68
32	160	Duke University, Durham, N.C.	29
32	160	Res. Triangle Inst., Durham, N.C.	39
Raleigh, N.C.			116
32	510	Elect. Storage Battery, Raleigh, N.C., miss battery	49
32	510	N.C. State College, Raleigh, N.C.	67
Akron, Ohio			104
34	005	Goodyear Aircraft, Akron, Ohio	104
Barberton, Ohio			880
34	035	Babcock & Wilcox, San Francisco, Calif	833
34	035	White Sewing Machine, Cleveland, Ohio	47
Brecksville, Ohio			97
34	083	Smith Electronics, Brecksville, Ohio	97

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Cincinnati, Ohio			$7,482
34	150	Avco Corp., Cincinnati, Ohio	147
34	150	Cincinnati, University of, Cincinnati, Ohio	249
34	150	Eagle-Picher Co., Cincinnati, Ohio	97
34	150	General Electric, Cincinnati, Ohio, Flt. Prop. Lab	6,954
34	150	Young & Bertke Co., Cincinnati, Ohio	35
Cleveland, Ohio			14,721
34	160	Assoc. Builders, Cleveland, Ohio	73
34	160	Baldwin Lima Hamilt., New York, N.Y., Loewy-Hydro	305
34	160	Brush Beryllium Co., Cleveland, Ohio	348
34	160	Canal Industrial, Bethesda, Md	62
34	160	Chic. Bridge & Iron, Cleveland, Ohio	654
34	160	Case Inst. Tech., Cleveland, Ohio	503
34	160	Dalton-Dalton Assoc., Cleveland, Ohio	40
34	160	Designers for Indust., Cleveland, Ohio	40
34	160	Drever Corp., Bethayres, Pa	33
34	160	Electro, Instruments, San Diego, Calif	26
34	160	Elect. & Misslie Fac., New York, N.Y	1,127
34	160	Feldman Bros., Cleveland, Ohio	254
34	160	H. K. Ferguson, Cleveland, Ohio	126
34	160	Frandor Corp., Berea, Ohio	40
34	160	General Electric, Cleveland, Ohio	60
34	160	General Motors Corp., Cleveland, Ohio, Cleve. Diesel	65
34	160	Gilmore Industries, Cleveland, Ohio	36
34	160	Hargett & Hoag, Cleveland, Ohio	49
34	160	Harvey Wells Corp., Framingham, Mass	76
34	160	Herbst Electric, Cleveland, Ohio	67
34	160	Herkner Contract Co., Cleveland, Ohio	362
34	160	Heyduk Landscape, Cleveland, Ohio	27
34	160	Internat. Bus. Mach., Cleveland, Ohio	29
34	160	Jerrold Electronics, Philadelphia, Pa	59
34	160	Kelsey-Hayes Co., Philadelphia, Pa., Heintz	33
34	160	Lake Erie Electric, Cleveland, Ohio	158
34	160	Wm. Passalacqua, Cleveland, Ohio	1,204
34	160	Plant Security, Inc., Washington, D.C	84
34	160	Project Fabricators, Long Island, N.Y	142
34	160	Pace Engineering, Cleveland, Ohio	26
34	160	Radio Corp. of America, Camden, N.J	267
34	160	Geo. A. Rutherford, Cleveland, Ohio	1,005
34	160	Ryan Industries, Inc., Cleveland, Ohio	27
34	160	Rapid Electric Co., Bronx, N.Y	180
34	160	Solar Aircraft Co., San Diego, Calif	352
34	160	Suburb Plumb. & Heat, Cleveland, Ohio	137
34	160	Sylvania Corning Nuc., Bayside, N.Y	149
34	160	Thompson-Ramo-Wooldridge, Cleveland, Ohio, Tapco Group	5,413
34	160	Tobe Deutschmann Lab, Canton, Mass	26
34	160	Union Carbide Corp., New York, N.Y., Linde Co	423
34	160	AF Systems Command, Washington, D.C	560
34	160	Westinghouse Elect., Cleveland, Ohio	75
Columbus, Ohio			881
34	180	Batelle Memorial Ins., Columbus, Ohio	576
34	180	Marshall Products, Columbus, Ohio	26
34	180	Ohio Semiconductors, Columbus, Ohio	34
34	180	Ohio State University, Columbus, Ohio	245

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Dayton, Ohio			$2,652
34	210	Harris Intertype, Cleveland, Ohio, Seybold Co	29
34	210	AF Logistics Command, Dayton, Ohio, Aero Syst	1,985
34	210	AF Systems Command, Wright Patt AFB, Ohio, Aeromed Lab	638
Lima, Ohio			106
34	425	Westinghouse Elect., Washington, D.C	106
Mount Vernon, Ohio			177
34	545	Cooper Bessemer Corp., Washington, D.C	177
Sandusky, Ohio			3,919
34	715	Assoc. Piping & Eng., Compton, Calif	892
34	715	Avtron Manufact., Cleveland, Ohio	86
34	715	Bausch & Lomb, Inc., Rochester, N.Y	43
34	715	Consol. Electrodynam., Monrovia, Calif	492
34	715	Cont. for Radiation, Cambridge, Mass	364
34	715	Feldman Bros., Co., Cleveland, Ohio	531
34	715	Ferguson, H. K., Co., Cleveland, Ohio	50
34	715	Fischbach & Moore, Dallas, Tex., Instrumenta	27
34	715	Funk Construction Co., New London, Ohio	29
34	715	Itek Corp., Cambridge, Mass., Hermes Elect	34
34	715	T. J. Hume Co., Lorain, Ohio	610
34	715	Instron Eng. Corp., Canton, Mass	35
34	715	Jess Howard Elect., Columbus Ohio	51
34	715	Kearfott Co., Clifton, N.J	69
34	715	Lake Erie Elect., Lorain, Ohio	33
34	715	Lieb-Jackson, Inc., Columbus, Ohio	131
34	715	Lockheed Aircraft, Marietta, Ga., Nuclear Prod	404
34	715	Protective Coatings, Cleveland, Ohio	38
Worthington, Ohio			36
34	911	Antlab Inc., Worthington, Ohio	36
Norman, Okla			26
35	450	Dorsett Electronics, Norman, Okla	26
Stillwater, Okla			669
35	640	Labko Scientific, Inc., Stillwater, Okla	430
35	640	Oklahoma State University, Stillwater, Okla	239
McMinnville, Oreg			82
36	190	Linfield Res. Inst., McMinnville, Oreg	82
Portland, Oreg			84
36	260	Williamette Ir. Steel, Portland, Oreg	84
Allentown, Pa			890
37	008	Air Products & Chem., Allentown, Pa	827
37	008	Aldrich Pump Co., Allentown, Pa	63

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Andulusia, Pa			$30
37	013	Bickley Furnaces, Inc., Philadelphia, Pa	30
Bala-Cynwyd, Pa			79
37	035	Decker Corp., Bala-Cynwyd, Pa	79
Callery, Pa			415
37	093	Mine Safety Applian., Callery, Pa., MSA Res Corp	415
Chambersburg, Pa			215
37	110	Army, Secretary of, Washington, D.C. Chief of Ord	25
37	110	Army Ordnance, Chambersburg, Pa., Supply Manag	190
East Pittsburgh, Pa			1,028
37	194	Westinghouse Electr., East Pittsburgh, Pa	1,028
Harrisburg, Pa			67
37	278	Amp., Inc., Harrisburg, Pa	25
37	278	Harsco Corp., Harrisburg, Pa., Harris Steel	42
Hatboro, Pa			1,854
37	280	Boonshaft & Fuchs, Hatboro, Pa	203
37	280	Compudyne Corp., Hatboro, Pa	1,651
Johnsville, Pa			210
37	315	Navy Bur Weapons, Johnsville, Pa., Air Dev Cent	210
King of Prussia, Pa			27
37	321	Wiedemann Machine, San Francisco, Calif	27
Lancaster, Pa			125
37	328	Radio Corp. of Amer., Lancaster, Pa., Elect Tube	125
McKeesport, Pa			49
37	380	U.S. Steel Corp., Pittsburgh, Pa., Natl Tube	49
Paoli, Pa			36
37	482	Burroughs Corp., Paoli, Pa	36
Philadelphia, Pa			11,392
37	492	Amer Bosch Arma, Philadelphia, Pa	185
37	492	Astravac Corp., Burlingame, Calif	30
37	492	B. & F. Instruments, Philadelphia, Pa	29
37	492	Budd Co., Philadelphia, Pa., Space Atomic	42
37	492	Budd Co., Philadelphia, Pa	291
37	492	Display House, Philadelphia, Pa	32
37	492	Franklin Inst., Philadelphia, Pa	134
37	492	General Dynamics, San Diego, Calif., Convair Astr	250
37	492	General Electric, Philadelphia, Pa., Missile Sp V	9,047

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
37	492	Internat Resistnc Co., Philadelphia, Pa	$27
37	492	Stokes, F. J. Corp., Philadelphia, Pa	830
37	492	Temple Univ., Philadelphia, Pa	66
37	492	Army Signal Corps, Philadelphia, Pa., Supp Agency	227
37	492	Navy Research ONR, Washington, D.C	124
37	492	Navy Bur Weapons, Philadelphia, Pa., Air Material	78
Pittsburgh, Pa			3,962
37	500	American Optical Co., Pittsburgh, Pa	567
37	500	Blaw Knox, Pittsburgh, Pa	586
37	500	Combust Explos Res, Pittsburgh, Pa	35
37	500	John Unertl Optical, Pittsburgh, Pa	116
37	500	Mellon Inst, Pittsburgh, Pa	152
37	500	Pitt Des Moine Steel, Pittsburgh, Pa	2,091
37	500	Pittsburgh Piping Eq, Pittsburgh, Pa	415
Pottstown, Pa			128
37	516	Sanders & Thomas, Inc., Pottstown, Pa	128
Scranton, Pa			93
37	552	Engineering Supervis, New York, N.Y	93
Southhampton, Pa			221
37	585	Vector Manufac, Southhampton, Pa	221
State College, Pa			309
37	602	Penn State Univ, State College, Pa	272
37	602	AF Systems Commd, Dayton, Ohio, WADC	37
Swarthmore, Pa			45
37	618	Franklin Institute, Swarthmore, Pa., Bartol Res	45
Trafford, Pa			305
37	636	Westinghouse Elec., San Francisco, Calif	305
Willow Grove, Pa			83
37	691	Tinius Olsen Testing, Willow Grove, Pa	83
Wynnewood, Pa			25
37	701	Machinery Associates, Wynnewood, Pa	25
Providence, R.I			83
38	200	Speidel Corp., Providence, R.I	83
Sioux Falls, S. Dak			184
40	140	Chicago, University of, Chicago, Ill	105
40	140	Navy Research ONR, Washington, D.C	79
Bristol, Tenn			1,616
41	030	Sperry Rand Corp., Bristol, Tenn., Farragut	1,616

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Nashville, Tenn			$441
41	440	Avco Corp., Nashville, Tenn	390
41	440	Wright, Fred D., Co., Nashville, Tenn	51
Oak Ridge, Tenn			150
41	455	Atomic Energy Commission, Oak Ridge, Tenn	150
Tullahoma, Tenn			1,203
41	550	Micro Craft, Inc., Tullahoma, Tenn	136
41	550	AF systems Command, Tullahoma, Tenn., AEDC	1,067
Austin, Tex			370
42	050	Texas, University of, Austin, Tex	370
Dallas, Tex			23,978
42	250	Chance Vought, Dallas, Tex., Vought Elect	23,326
42	250	Internatl. Data Syst., Dallas Tex	100
42	250	Texas Instruments, Dallas, Tex	446
42	250	Texas, University of, Dallas, Tex., med. school	33
42	250	Temco Elect. & Missil., Dallas, Tex	73
El Paso, Tex			263
42	310	Texas, University of, El Paso, Tex., Schellenger	263
Fort Worth, Tex			572
42	335	Bell Aero-Space Corp., Fort Worth, Tex., helicopter	40
42	335	General Dynamics, Fort Worth, Tex., Convair	325
42	335	Hedrick, Wyatt C., Fort Worth, Tex	207
Houston, Tex			1,441
42	440	Dresser Industries, Houston, Tex., Sie. Div	32
42	440	General Services Administration, Forth Worth, Tex. Federal supply	46
42	440	Houston, University of, Houston Tex	30
42	440	Rice Institute, Houston, Tex	1,206
42	440	Todd Shipyards Corp., Houston, Tex., Houston	127
Mineral Wells, Tex			237
42	625	All Products, Mineral Wells, Tex	237
Richardson, Tex			2,191
42	756	Alpha Corp., Richardson, Tex., Collins Rado	2,191
San Antonio, Tex			166
42	780	Southwest Res. Inst., San Antonio, Tex	166
Salt Lake City, Utah			37
43	200	Utah Res. & Dev. Co., Salt Lake City, Utah	37

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Alexandria, Va			$1,504
45	020	Aero Geo. Astro Corp., Alexandria, Va	729
45	020	Atlantic Research, Alexandria, Va	278
45	020	Commerce, Department of, Washington, D.C., Bur. Standard	90
45	020	Mount Vernon Research Co., Alexandria, Va	289
45	020	Army Engineers, Fort Belvoir, Va., R. & D. lab	83
46	020	Navy Research, ONR, Washington, D.C., research lab	35
Arlington, Va			298
45	050	Consolid Electrodyn, Arlington, Va	28
45	050	Corp. Econ. Indust. Res., Arlington, Va	270
Dahlgren, Va			25
45	157	Navy, Bur. Weapons, Dahlgren, Va., proving ground	25
Gainesville, Va			130
45	225	Atlantic Research, Alexandria, Va	130
Hampton, Va			424
45	240	Compudyne Corp., Hatboro, Pa	424
Langley, Va			19,814
45	269	Air Products & Chem., Washington, D.C	256
45	269	Bell Aerosystems Co., Buffalo, N.Y	92
45	269	Boonshaft & Fuchs, Huntington Valley, Pa	78
45	269	Bryhn & Henderson, Williamsburg, Va	97
45	269	Chesapeake & Potomac Telephone, Richmond, Va	97
45	269	Chicago Bridge Iron, Philadelphia, Pa	86
45	269	Compudyne Corp., Hatboro, Pa	174
45	269	Cutler Hammer, Inc., Long Island, N.Y., Airborne Inst	34
45	269	University of Chicago, Chicago, Ill., natl. opinion	70
45	269	Capehart Corp., Richmond Hill, N.Y	26
45	269	Doyle & Russell, Norfolk, Va	989
45	269	Empire Gas Engineer, Atlanta, Ga	699
45	269	Endebrock White Co., Newport News, Va	37
45	269	E. C. Ernst, Inc., Washington, D.C	727
45	269	Elswick Construct Co., Bayside, Va	34
45	269	Fluidyne Eng. Corp., Minneapolis, Minn	49
45	269	Ferguson Corp., Newport News, Va	292
45	269	J. E. Greiner, Baltimore, Md	57
45	269	Grenco Services, Inc., Baltimore, Md	1,161
45	269	Richard E. Holland, Williamsburg, Va	27
45	269	H.L.S Construct., Hampton, Va	78
45	269	International Business Machines, Norfolk, Va	2,957
45	269	Kahoe Co., Bel Air, Md	261
45	269	M. & T. Co., Philadelphia, Pa	138
45	269	McDonough Construction Co., Atlanta, Ga	254
45	269	L. H. Perlin Co., Newport News, Va	132
45	269	Philco Corp., Philadelphia, Pa., Tech. Rep. Div	508
45	269	J. F. Pritchard, Kansas City, Mo	775
45	269	Radio Corp. of America, Camden, N.J., RCA service	27
45	269	Remsco Assoc., Inc., Matawan, N.J	324
45	269	Rogers & McGrath, Washington, D.C	3,698
45	269	W. H. Singleton Co., Arlington, Va	1,174

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Langley, Va.—Continued			
45	269	Smith Corp., A. O., New York, N.Y	$1,661
45	269	Spiers & Co., Inc., Newport News, Va	62
45	269	States Construction, Newport News, Va	39
45	269	AF Tac Air Command, Langley, Va., Base Supply	42
45	269	Virginia Electric Power, Hampton, Va	31
45	269	Westinghouse Electric, Norfolk, Va	2,498
45	269	Wms. Coile Blanchard, Newport News, Va	48
Newport News, Va			80
45	310	Modern Machine & Tool, Newport News, Va	80
Painter, Va			305
45	338	J. W. Fecker, Pittsburgh, Pa	305
Phoebus, Va			72
45	350	Radio Corp. of Amer., Camden, N.J., RCA Serv. Co	72
Portsmouth, Va			25
45	370	Navy Bur. Ships, Portsmouth, Va., Norfolk, Shipyard	25
Richmond, Va			48
45	400	Medical College, Va., Richmond, Va	48
Roanoke, Va			28
45	410	Hayes, Seay, Mattern, Roanoke, Va	28
Wallops Island, Va			6,945
45	495	Cubic Corp., San Diego, Calif	420
45	495	Commerce, Department of, Washington, D.C	649
45	495	Eastern Eng. & Contr., Salisbury, Md	98
45	495	International Business Machines, Washington, D.C	172
45	495	Leonard, Henry, Chincoteague, Va	150
45	495	Maddox, Wyle, Oak Hill, Va	196
45	495	Marguardt Corp., Van Nuys, Calif., Cooper	130
45	495	Miller Electric, Salisbury, Md	262
45	495	Radio Corp. of America, Camden, N.J., RCA Service Co	196
45	495	Santaniello Brothers, Newark, N.J	37
45	495	Stephens, Earl R., Chincoteague, Va	44
45	495	Army Ordnance, Huntsville, Ala., ARMGA	148
45	495	Navy Bur. Weapons, Washington, D.C	4,050
45	495	V C Constructors, Norfolk, Va	393
Williamsburg, Va			67
45	510	William & Mary College, Williamsburg, Va	67
Seattle, Wash			99
46	300	Boeing Co., Seattle, Wash	99
Fond du Lac, Wis			381
48	190	Giddings Lewis Mach, Fond du Lac, Wis	211
48	190	Modern Machinery, Birmingham, Ala	170

All active NASA contracts over $25,000 as of Dec. 31, 1961—Continued

			Cumulative award (thousands)
Madison, Wis			$1,012
48	370	Gisholt Machine Co., Madison, Wis	35
48	370	Wisconsin, Univ of, Madison, Wis	977
Milwaukee, Wis			592
48	460	Kearney & Trecker, Milwaukee, Wis	30
48	460	A O Smith Corp., New York, N.Y	562
College, Alaska			995
50	250	Alaska, Univ of, College, Alaska	995
Fairbanks, Alaska			300
50	350	Alaska, Univ of, College, Alaska, Geophy Inst	300
Honolulu, Hawaii			1,440
55	300	Fed Aviation Agency, Honolulu, Hawaii	119
55	300	Hawaii, Univ of, Honolulu, Hawaii	120
55	300	AF Systems Commd, Inglewood, Calif., Space system	480
55	300	Navy Bur Yds & Docks, Washington, D.C	460
55	300	Navy Bur Weapons, Washington, D.C	361

LOCATION OF NASA PRIME CONTRACTORS

Mr. SIEPERT. As to your geographical question on the concentration of prime awards, the bulk of the contracts let directly by NASA go to the relatively few States in which the main aircraft and electronics firms have concentrated. Ten percent of the States have 90 percent of the current direct awards. It is at the subcontract level that the work becomes spread among many States.

Mr. YATES. Do you have such a study to show that?

Mr. SIEPERT. Yes; we do on our prime contracts. We keep this continuously. But we are also building a new reporting system to give us first and second tier subcontract information as well.

SMALL BUSINESS PROGRAM

Mr. JONAS. Do you follow the set-aside small business principle?

Mr. SIEPERT. We do; but that is not our primary reliance on the way we get or give awards to small business.

Mr. JONAS. Does the set-aside law apply to you?

Mr. SIEPERT. Yes, sir.

Mr. JONAS. That requires you to give all contracts under $500,000 to small business; is that right?

Mr. SIEPERT. No.

Mr. JONAS. That is construction, but that does not apply to procurement?

Mr. WEBB. You see, the accomplishment of this space flight mission is the main criteria that is used, and wherever it is possible to either give the contracts to small business, or to require a prime contractor to do it, we do that. We require a report from the prime contractor and this is very carefully worked out in a set of regulations.

Mr. JONAS. In Defense Department construction, all contracts under half a million dollars are automatically required to be given to small business concerns; is that true?

Mr. YATES. I was under the impression price had to be competitive with big business.

Mr. JONAS. That is——

Mr. THOMAS. That is the purpose of the set-aside.

Mr. JONAS. They are set aside.

Mr. WEBB. Most of these contracts are research and development contracts. This is a different kind of thing than in other types of procurement for more standard articles.

Mr. SIEPERT. This statistic might be helpful to you. Of our total number of procurement actions 66 percent of them in the last 6 months went to small business. However, the dollar value would be somewhat smaller. Twelve percent of the total value of awards went to small business.

I might say our program in this area has been examined by the Small Business Committees in the Congress; we were highly praised for the aggressiveness of our small business program.

Mr. JONAS. I think there is something to be said on the other side. How much more is that costing the taxpayer? Are you entitled to as much praise if you are spending more of the taxpayers' money?

Mr. SIEPERT. I cannot comment on what is the military legislative authority for dealing with small business. But the criterion Mr. Yates made is the one that we follow. NASA does not set aside for small business unless we are certain that there is sufficient capability among the small business firms to do the best job in the country at no increase in cost.

Mr. YATES. Those are the criteria under the procurement program?

Mr. SIEPERT. That is right. Military construction projects may be different, but I know these are the criteria for the NASA procurement program. Small business firms must be competitive.

They get no special price advantage in competing in this program.

Mr. JONAS. That is the point.

Mr. YATES. I would like to have that made available for the record, Mr. Chairman, if it is all right.

Mr. THOMAS. Yes.

(The information supplied follows:)

SMALL BUSINESS PARTICIPATION IN NASA PROCUREMENT

Participation in direct awards.—During the first 6 months of fiscal year 1962, NASA placed about $40 million of purchases and contracts with small business firms (fig. 4). This is $11 million, or 39 percent, more than in the corresponding period of fiscal year 1961. In terms of actions, small business received about 35,000 awards, 36 percent more than in 1961.

Of the total awards to business, small business firms received 12 percent of the dollars in 1962 as compared to 16 percent in 1961; in terms of the number of awards, 66 percent in 1962 as against 65 percent in 1961.

Although the proportion of dollar awards to small business was lower in 1962 than in 1961, NASA's continuing emphasis on small business participation in the space program may be observed from the data in the following table. These data provide a comparison between the 2 years and also show how NASA has distributed the new contracts awarded in 1962. Such data are available only for contracts of $25,000 and over.

It will be noted that in 1961 the small business share of these larger contracts, which were predominantly new contracts, amounted to 7 percent. In 1962, 13 percent of the new contracts were awarded to small business.

Comparison with first 6 months of fiscal year 1961 awards of $25,000 and over[1]

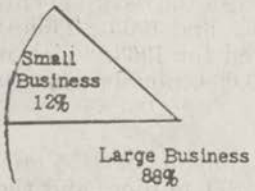
Type of contractor	1st 6 months fiscal year 1961		1st 6 months, fiscal year 1962					
			Total		New contracts		Modifications	
	Million	Percent of total	Million	Percent of total	Million	Percent of total	Million	Percent of total
Total	$149.3	100	$289.5	100	$117.8	100	$171.7	100
Small business	11.0	7	21.8	8	15.6	13	6.2	4
Large business	138.3	93	267.7	92	102.2	87	165.5	96

[1] Includes actions placed under General Services Administration contracts.

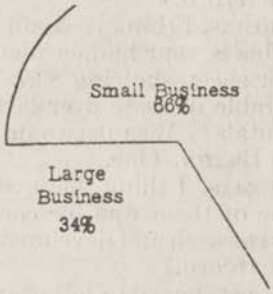
NOTE.—The 100 contractors that received the largest dollar value of NASA direct awards to business during the first 6 months of fiscal year 1962 are shown in appendix II. 22 of these contractors are small business firms.

SMALL BUSINESS PARTICIPATION IN NASA PROCUREMENT
July 1, 1961 - December 31, 1961

NET VALUE OF AWARDS



NUMBER OF ACTIONS



	(Millions)
Total	$331.1
Small Business	39.6
Large Business	291.5

	(Thousands)
Total	52.7
Small Business	35.0
Large Business	17.7

NOTE: Includes $14.6 million and 3.9 thousand actions placed under General Service Administration Contracts.

FIGURE 4.

Mr. THOMAS. Gentlemen, let us get into the budget tomorrow at 10 o'clock. We have had a very interesting day, Mr. Administrator. We are very grateful to you and your very learned and able staff. We will go into the dollars and cents tomorrow.

If you do not mind, it might be well if you bring with you two or three samples of the big contracts so that we can just take a look at them.

Mr. WEBB. Yes, sir.

TUESDAY, APRIL 17, 1962.

Mr. THOMAS. Gentlemen, the committee will please come to order.

ADDITIONAL WITNESSES

We have acquired since yesterday two very distinguished and learned scientists. We welcome aboard Dr. Silverstein and Dr. von Braun. Of course, we are delighted to have our regular crowd.

SUMMARY OF BUDGET ESTIMATES

We have a new budget, new in the sense that it is very difficult to work with. There is a wealth of information in it. Certainly we have no quarrel with you on that basis, because it is well prepared. It is one of these performance budgets which it is difficult for us to work with.

You have combined your Salaries and Expenses this year with Research and Development. We cannot separate it. I doubt if you distinguished gentlemen can do so. You have some very fine tables. It took a lot of time and effort to break them down among your installations. Then you have a construction program. That, too, is very clear. In fact, that is the clearest part of your budget.

(Off the record.)

Mr. THOMAS. I think it would be well to put S–1 in the record at this point. This is your budget picture for 1961, 1962, and 1963. This is your cover sheet, showing $3,787,276,000 requested for 1963, which is a considerable increase over last year, $1,671,750,000, plus how many supplementals? Was it two or one?

Dr. VON BRAUN. One.

Mr. THOMAS. I think there were two items totaling about $156 million. One of them was for construction, about $71 million, and the other was research and development, $85 million.

(Off the record.)

(The page referred to follows:)

Fiscal year 1963 estimates—Appropriation summary

	1961	1962	1962 supplemental	1963
Salaries and expenses	($170, 760, 000)	($206, 750, 000)		
Research and development	(670, 453, 000)	(1, 220, 000, 000)	($85, 000, 000)	
Research, development and operation	841, 213, 000	1, 426, 750, 000	85, 000, 000	$2, 968, 278, 000
Construction of facilities	122, 787, 000	245, 000, 000	71, 000, 000	818, 998, 000
Total	964, 000, 000	1, 671, 750, 000	156, 000, 000	3, 787, 276, 000

SUMMARY OF BUDGET ESTIMATE BY FUNCTION

Mr. THOMAS. Mr. Webb, I think it would be well for the record if at this time you gave us a quick bird's-eye view of your setup, particularly on the business end. You have as fine people as this Government has ever had the privilege of having associated with it. Will you detail their functions, tell us something about your outside committees, your advisory committees, and a quick, general briefing on your entire setup for the record?

Mr. WEBB. All right, Mr. Chairman.

I would like first to break down the figure of $3,787,276,000, to give you the money figure which relates to the organization chart. As you know from looking at these tables, $2,968,278,000 of this figure is for research, development, and operation; and $818,998,000 is for construction of facilities.

To break those figures down by programs, which is the manner in which the funds are administered, would yield the result of $2,260 million for manned space flight, including the large boosters and the facilities necessary to design, assemble, test, fly, and then track and keep control of the apparatus in space.

With respect to space sciences, the figure is $556 million. I believe I indicated yesterday that the cost of firing the rockets, the ground installation costs, and the tracking and data acquisition cost in areas like sounding rockets, the scientific satellites, and unmanned lunar and planetary exploration were the larger part of those costs.

With respect to the advanced research and technology, the budget is $618.5 million, and the figure $213 million is for tracking and data acquisition. I need to combine the figures for communications satellites and meteorological satellites, and so forth, for the applications figure, unless Mr. Stoller can give it to me now.

Dr. SEAMANS. $139 million.

Mr. WEBB. $139 million in the area of applications.

ORGANIZATION OF NASA

As you know, we have four program managers: Mr. Brainerd Holmes for Manned Space Fight, Dr. Homer Newell for Space Sciences, Mr. Morton Stoller for Applications, and Mr. Thomas Dixon is Acting Director of the Advanced Research and Technology Development. Dr. Abbott held that office. He had to retire on account of health. We are now actively negotiating for a man to take that office. In the meantime, Mr. Dixon, as deputy to Dr. Seamans, is carrying this responsibility.

RESPONSIBILITIES OF PROGRAM MANAGERS

These program managers are directly and personally responsible, under our organization, for carrying out the programs which we have outlined to you in our presentation in our budget book. However, they must rely on the directors of our centers to carry out a great deal of this activity. The purpose of this kind of organization is to get the greatest service out of men like Dr. von Braun. To have him report only in to Manned Space Flight, where most of his work with the big boosters and other types of space flight operations are involved, would then deny or at least make a more circuitous route through which advanced research and technology programs could get the benefit of his assistance. The Space Sciences the same. So, we have 4 program managers with 10 centers serving any one of these 4 program managers.

COORDINATION OF OVERALL OPERATION

The business organization is supervised through our General Manager, Dr. Seamans, who is here today. The staff in Dr. Seamans' office, to keep control of both the programs and the operations in the centers, is divided into two sections. The first is that of the Office of Programs, under Mr. Wyatt, whom you know; and the second part is the Office of Administration, under Mr. Siepert. Both of these tools of the General Manager work with the program managers in the headquarters offices, work with the center directors, and, indeed, participate in negotiating some of the contracts which we have, where large and important amounts or new principles are involved or where there are particular difficulties to be solved, such as the difficulties we had in combining Westinghouse and Aerojet into an industrial team in a joint office operated by us and the Atomic Energy Commission. In such a case as that, the General Manager, with his administrative staff—and, indeed, Dr. Dryden and I both became involved in this particular negotiation.

Mr. THOMAS. Will the committee turn to the table of organization, A7–1, and the breakdown on the following six or seven pages? Then you can follow better the Administrator's presentation. A7–1 tells the tale.

Mr. WEBB. On A7–1, you will note that the focal point for the operations of the Agency are in the central box, Dr. Robert C. Seamans, Jr., who is the Associate Administrator and General Manager of the Agency. He has, as I indicated, the Office of Programs under Mr. Wyatt, the Office of Administration under Mr. Siepert; then, directly reporting to him are the four program managers indicated on the next horizontal line. Then, reporting also directly to him are the centers.

You will note the one exception to this is that, because tracking and data acquisition serve all of these functions, both the program managers and, in many cases, the centers—the center like Goddard, which is concerned with many of these scientific satellites—we have broken that out and have it as a central office reporting directly to Dr. Seamans.

There are many other facets of the top management structure which Dr. Dryden and I handle, such as the Inventions and Contributions Board, the Office of Legislative Affairs, the Office of Plans and Program Evaluation, which is a very small, long-range planning group. We have the area of public affairs under Dr. Hiden Cox; the administrative organization of my immediate office under Colonel Young as executive assistant; the General Counsel, under John Johnson; the Office of International Programs, which is very active in this agency, under Mr. Frutkin. Then we have the Research Advisory Committees, which you would like to have explained. If you will permit, I would like Dr. Seamans to go into the Advisory Committees.

ADVISORY COMMITTEES

Mr. THOMAS. We are very much interested in the Advisory Committees. Tell us about them, Doctor.

Dr. SEAMANS. We have 11 Advisory Committees. These are committees advising the NASA in the area of our long-term advisory research and technology.

Mr. EVINS. Are these shown on the chart?

Dr. SEAMANS. They are shown at the very top with a dotted line connecting the 11 committees to the Administrator.

Mr. THOMAS. What is the background, experience, and training of the Advisory Committees? These are people from private industry serving the Government. They draw no salaries. They are used on a consultant basis.

Dr. SEAMANS. That is right. We pay their per diem and their travel to and from the place of meeting.

Mr. THOMAS. What is their regular business?

Dr. SEAMANS. They are drawn from within the NASA, they are drawn from other Government agencies, and they are drawn from universities and industry. For the record, I might put in the list of the 11 committees, if you would like.

Mr. THOMAS. We would like that.

Dr. SEAMANS. We will have that for the record.

(The information supplied follows:)

1. NASA Research Advisory Committee on Fluid Mechanics.
2. NASA Research Advisory Committee on Aircraft Aerodynamics.
3. NASA Research Advisory Committee on Missile and Space Vehicle Aerodynamics.
4. NASA Research Advisory Committee on Control, Guidance, and Navigation.
5. NASA Research Advisory Committee on Aircraft Structures.
6. NASA Research Advisory Committee on Missile and Space Vehicle Structure.
7. NASA Research Advisory Committee on Materials.
8. NASA Research Advisory Committee on Aircraft Operating Problems.
9. NASA Research Advisory Committee on Chemical Energy Systems.
10. NASA Research Advisory Committee on Nuclear Energy Systems.
11. NASA Research Advisory Committee on Electrical Energy Systems.

NATURE AND FUNCTION OF ADVISORY COMMITTEES

Dr. SEAMANS. It is important to recognize that these committees do not become involved in the large projects, as, for example, the Apollo, the Gemini, the Saturn. They do not review that kind of NASA effort. They are reviewing the kind of advanced programs that we have underway. They review the kinds of facilities we have for carrying out this long-term work. They meet approximately three or four times a year for a session at an appropriate location. If it is a group concerned with guidance, they will meet at Huntsville, and they will review with Dr. Haeussermann and his people, work which is going on there of a long-term nature. The propulsion group will meet frequently at the Lewis Research Center, where Dr. Abe Silverstein will discuss with them our work in the field of electric and nuclear propulsion, the work which is to have such an important bearing on our efforts 5 to 10 years hence. They do not in any way get into decisionmaking with regard to our large projects. They do recommend, for example, that we put more emphasis on reentry physics. That might be an area which would concern them. They might indicate the kind of experimental programs that they would recommend for the laboratory at Ames, and possibly a certain amount of actual experimentation in actual flight tests for reentry data.

Mr. THOMAS. To summarize it, you have had these committees many years, and they have always rendered very outstanding service. There is nothing new about them. You have had them, we here can recall, at least 15 years. It is good to have some outside people coming in looking over your shoulders. These people are very capable in their own fields. They range all the way from businessmen to college professors and Government people. I presume you have some people from the Army, Navy, and Air Force on these committees, too.

Dr. SEAMANS. Yes, we have.

EVALUATION BOARDS

Mr. THOMAS. From the business point of view, have you any outside advice or consultation?

Mr. WEBB. Not on the business decisions we make with respect to contracts. We have a very careful evaluation system of the proposals made to us, and we take that responsibility within the Government to make those decisions.

Mr. THOMAS. Who is on the evaluation board, and how does it function now?

Mr. WEBB. The evaluation board is usually chaired by someone from one of our centers who is thoroughly familiar with the work which has to be accomplished under the contract, and frequently, as you know——

Mr. THOMAS. In his field of operation.

Mr. WEBB. Added to him are people from all over the organization who are most experienced in the various facets of this particular work, including people from the business office. In every one of these evaluations we go through the technical competence of the contractor, match that against what we know to be the state of the art, evaluate his proposals, really to try to find out if he understands the problem and the best way to solve it. Then we go very carefully into his facilities for carrying out the contract, very carefully into the personnel he proposes to assign to the contract. So, we evaluate his understanding of the work, his facilities for carrying it out, the personnel he expects to use to carry it out. We have a separate section of the evaluation called the business evaluation, which then goes very carefully into the company itself, its resources, its management records, its costs, and we do pay considerable attention to the question of whether the contractor delivers on time and at a reasonable cost to the Government.

Mr. THOMAS. Thank you. That is very much to the point.

RESEARCH, DEVELOPMENT, AND OPERATION

Object classification

[In thousands of dollars]

	1961 actual	1962 estimate	1963 estimate
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION			
Personnel compensation:			
Permanent positions	122,072	153,494	202,060
Positions other than permanent	626	1,230	1,465
Other personnel compensation	11,580	11,989	16,786
Total personnel compensation	134,278	166,713	220,311
Direct obligations:			
11 Personnel compensation	130,483	163,830	219,086
12 Personnel benefits	8,966	11,430	15,230
21 Travel and transportation of persons	5,235	9,167	16,080
Hire of motor vehicles	152	192	370
22 Transportation of things	3,958	6,507	8,465
23 Rent, communications, and utilities:			
Rents	10,402	17,255	31,968
Communication services	2,394	4,062	5,104
Electric power	6,474	5,840	5,984
Other utilities	1,615	1,464	1,818
24 Printing and reproduction	750	2,062	3,319
25 Other services:			
Research and development	395,597	800,003	1,997,200
Services of other agencies	136,000	250,000	400,000
Repairs, alterations, and minor construction	6,313	9,766	12,287
Miscellaneous services	10,300	14,000	17,000
Services of other agencies	5,669	8,319	8,800
26 Supplies and materials	68,103	93,987	160,013
31 Equipment	17,690	30,990	65,403
42 Insurance claims and indemnities	8	110	116
Unvouchered	5	18	35
Total direct obligations	810,114	1,429,002	2,968,278
Reimbursable obligations:			
11 Personnel compensation	3,795	2,883	1,225
12 Personnel benefits	309	161	92
21 Travel and transportation of persons	64	82	55
22 Transportation of things	16	10	----
23 Rent, communications, and utilities:			
Rents	1,978	1,708	133
Communication services	----	20	----
Electric power	36	762	1,450
24 Printing and reproduction	30	15	2
25 Other services: Research and development	4,503	46,997	64,975
26 Supplies and materials	3,659	27,556	20,015
31 Equipment	650	1,010	4,515
Total reimbursable obligations	15,040	81,204	92,462
Total, National Aeronautics and Space Administration	825,154	1,510,206	3,060,740
ALLOCATION ACCOUNTS			
25 Other services	10	1	----
Total obligations	825,164	1,510,207	3,060,740
Obligations are distributed as follows:			
National Aeronautics and Space Administration	825,154	1,510,206	3,060,740
Atomic Energy Commission	9	----	----
General Services Administration	1	1	----

Personnel summary

	1961 actual	1962 estimate	1963 estimate
Total number of permanent positions	17,077	21,880	26,273
Full-time equivalent of other positions	78	154	183
Average number of all employees	15,949	19,383	25,145
Number of employees at end of year	17,471	22,000	26,300
Average GS grade	9.5	9.8	9.8
Average GS salary	$8,112	$8,351	$8,497
Average salary, grades established by the Administrator, NASA	$6,498	$6,522	$6,525
Average salary of ungraded positions	$16,776	$16,890	$16,885

Program and financing

[Thousands of dollars]

	Budget plan (amounts for research, development, and operation actions programed)			Obligations		
	1961 actual	1962 estimate	1963 estimate	1961 actual	1962 estimate	1963 estimate
Program by activities:						
Direct:						
1. Manned space flight:						
(a) Spacecraft development and operations	130,596	215,520	876,887	117,265	210,036	876,887
(b) Launch vehicle development	174,828	316,164	747,983	171,919	318,016	747,983
2. Space applications:						
(a) Meteorology	19,610	54,310	51,185	18,126	52,614	51,185
(b) Communications	33,833	48,347	85,377	13,501	51,889	85,377
3. Unmanned investigations in space:						
(a) Spacecraft development and operations	157,747	301,843	467,882	163,199	310,564	467,882
(b) Launch vehicle development	84,804	76,611	75,879	85,721	80,124	75,879
4. Space technology:						
(a) Launch vehicles and spacecraft	41,077	62,449	107,260	40,962	64,196	107,260
(b) Propulsion and space power	115,752	190,657	344,827	121,973	201,410	344,827
5. Aircraft and missile technology	37,857	41,479	52,588	38,810	42,225	52,588
6. Supporting operations	44,330	96,504	158,410	38,648	97,929	158,410
Total direct	840,434	1,403,884	2,968,278	810,124	1,429,003	2,968,278
Reimbursable:						
2. Space applications:						
(a) Meteorology	----------	34,780	40,600	----------	34,780	40,600
(b) Communications	----------	11,106	----------	----------	11,106	----------
3. Unmanned investigations in space:						
(a) Spacecraft development and operations	138	----------	----------	138	----------	----------
4. Space technology:						
(a) Launch vehicles and spacecraft	----------	250	----------	----------	250	----------
(b) Propulsion and space power	2	7,100	28,700	2	7,100	28,700
5. Aircraft and missile technology	14,089	27,250	23,162	14,900	27,968	23,162
Total reimbursable	14,229	80,486	92,462	15,040	81,204	92,462
Total	854,663	1,484,370	3,060,740	825,164	1,510,207	3,060,740

Financing:						
Comparative transfer from other accounts	−173,046	−222,391		−172,198	−222,391	
Unobligated balance brought forward for completion of prior year budget plans				−47,663	−76,314	−50,477
Unobligated balance transferred from—						
"Construction of facilities" (74 Stat. 436)		−1,490			−1,490	
"Salaries and expenses, Advanced Research Projects Agency, Department of Defense" (42 U.S.C. 2453)	−1,661			−1,661		
Advances and reimbursements from—						
Other accounts	−8,001	−63,845	−92,462	−8,001	−63,845	−92,462
Non-Federal sources (42 U.S.C. 2473)		−11,000			−11,000	
Unobligated balance carried forward for completion of prior year budget plans				76,314	50,477	50,477
New obligational authority	671,955	1,185,644	2,968,278	671,955	1,185,644	2,968,278
New obligational authority:						
Appropriation	670,453	1,220,000	2,968,278	670,453	1,220,000	2,968,278
Transferred from "Salaries and expenses" (74 Stat. 436)	3,352			3,352		
Transferred to:						
"Salaries and expenses" (75 Stat. 742)		−10,000			−10,000	
"Construction of facilities" (74 Stat. 436 and 75 Stat. 355)	−1,850	−24,356		−1,850	−24,356	
Appropriation (adjusted)	671,955	1,185,644	2,968,278	671,955	1,185,644	2,968,278

NOTE.—Reconciliation of budget plan to obligations:

	1961 actual	1962 estimate	1963 estimate
Total budget plan	$854,663	$1,484,370	$3,060,740
Deduct portion of budget plan to be obligated in subsequent years	70,973	50,477	50,477
Deduct portion of budget plan unobligated and lapsing at end of year	848		
Add obligations of prior year budget plans	42,322	76,314	50,477
Obligations	825,164	1,510,207	3,060,740

Mr. THOMAS. May I ask the committee to turn to page 389 of the committee print. You will notice there big programs broken down with costs for 1961, 1962, and 1963. Then turn to pages 390 and 391, which is a very fine narrative, and also pages 392 and 393. There is a breakdown of other objects on page 393. This tells the tale.

PERSONNEL SUMMARY AND PROGRAM HIGHLIGHTS

Notice the personnel summary on page 394 which indicated 17,077 jobs for 1961. Bear in mind that about 90 to 92 percent of the entire work of the agency is done outside of the organization. In other words, the in-house work of the organization varies from 8 to 10 percent. In 1962 they have 21,880 jobs, and in 1963 it goes up to 26,273 We will insert these pages in the record.

(The pages referred to follow:)

PROGRAM HIGHLIGHTS

The National Aeronautics and Space Administration (NASA) was established in 1958 to plan, develop, and conduct the nonmilitary space programs of the United States, including the exploration of space and its utilization for peaceful purposes, and to conduct and support advanced research and development related to aeronautics and space in support of both civilian and military programs.

In 1963 the estimates provide for consolidating the operating requirements of NASA, previously provided in the two appropriations—"Salaries and expenses" and "Research and development"—into a single appropriation for "Research, development, and operation." For comparative purposes the amounts in the two present appropriations for 1961 and 1962 have been combined in the schedules.

1. *Manned spaceflight.*—The funds under this activity provide for all NASA manned space flight projects, and for the development of the large launch vehicles needed for manned space exploration.

(a) *Spacecraft development and operations.*—Flights under Project Mercury have to date launched two astronauts into suborbital space flight and a chimpanzee into orbit around the earth as the precursor of manned orbital flights in 1962. At the same time steps are being taken in 1962 to initiate the advanced program for manned exploration of space which will lead to extended manned earth orbital flights, manned circumlunar flight, and a manned lunar landing and return within this decade. In 1963, expanded effort will be devoted to the two methods now under consideration to achieve a manned lunar landing—direct ascent from the earth to the moon and the use of rendezvous techniques to bring large spacecraft components together in earth orbit, after which the combined spacecraft would continue to the moon. The latter method, if successful, would permit an earlier attempt to land astronauts on the moon because it requires smaller launch vehicles than those required for a direct ascent to the moon. The major emphasis in 1963 will be placed on the development of a two-man spacecraft to test rendezvous technology, and of the three-man Apollo spacecraft which will be used for manned lunar flight with either the rendezvous or direct ascent method. In addition to contractor effort funded in this activity, the Manned Spacecraft Center, Houston, Tex., devotes primary emphasis to these projects with support from other NASA centers.

(b) *Launch vehicle development.*—In both 1961 and 1962, major emphasis in this activity was on the SATURN launch vehicle, the first stage of which was successfully launched in October 1961. The SATURN, with 1.5 million pounds of thrust in the first stage, will be used primarily to launch large spacecraft into earth orbit. The ADVANCED SATURN, generating a total of about 7 million pounds of thrust in the first stage, which was initiated in 1962, will be given major emphasis in 1963. This vehicle will be used for manned circumlunar flights and to boost the components of the Apollo spacecraft to a rendezvous in earth orbit from which manned lunar landings may be attempted. The NOVA launch vehicle, with at least 12 million pounds of thrust in the first stage, will also receive major funding in 1963. The NOVA will provide the capability for direct ascent of manned missions to the lunar surface. Actual development of these launch vehicles will be performed by industrial contractors. The NASA effort related to this activity is centered at the Marshall Space Flight

Center, Huntsville, Ala.; the Michoud Plant, New Orleans, La.; the Mississippi Test Facility, Pearl River, Miss.; and the Atlantic Missile Range, Cape Canaveral, Fla.

2. *Space applications.*—NASA funds under this activity provide for research and development on meteorological and communications satellite systems, supporting contractor effort and NASA operations in these fields at the Goddard Space Flight Center, Greenbelt, Md.

(a) *Meteorology.*—Work in this area has resulted in the successful launching of satellites in the continuing TIROS series. Research and development effort which began in 1962 on the more advanced Nimbus satellites will be expanded in 1963. The U.S. Weather Bureau is providing for initiation of an operational worldwide meteorological satellite system using the Nimbus satellite. Vehicle procurement, launching, and certain other services in connection with the operational system will be performed by NASA for the Weather Bureau on a reimbursable basis. NASA's meteorological satellite program also includes the development of advanced techniques and components for use in future systems.

(b) *Communications.*—NASA's work in the communications satellite field is being carried forward in cooperation with industry and the Department of Defense. In the passive communications satellite program work will continue in 1963 on the advanced Rebound passive communications satellite, to follow the highly successful Echo. In the field of active communications satellites, emphasis is aimed at early availability of operational communications satellite systems. Major projects include the Relay wide-band experimental satellites and the Syncom 24-hour orbit satellite system being developed in cooperation with the Department of Defense. Technological developments from Government research programs in the communications satellite area are being made available to encourage the earliest possible operational use by industry. In addition, NASA will provide services on a reimbursable basis to firms which wish to launch privately developed communications spacecraft such as the Telstar satellites to be launched in 1962. NASA will also initiate effort on advanced satellites of the intermediate altitude and 24-hour types.

3. *Unmanned investigations in space.*—This activity encompasses NASA's programs for unmanned scientific investigations in space and the development of the related launch vehicles. Effort in this area is primarily carried out by the Goddard Space Flight Center; Wallops Station, Wallops Island, Va.; the Jet Propulsion Laboratory, Pasadena, Calif.; other NASA centers and NASA contractors.

(a) *Spacecraft development and operations.*—The use of sounding rocket probes to acquire scientific data in nearby space will be expanded in 1963 with special emphasis on the work being done in cooperation with the Nation's universities. Major emphasis in the scientific satellite program in 1963 will be devoted to earth orbiting geophysical, astronomical, and solar observatories. Each observatory will carry multiple experiments to further increase man's knowledge of space. Work on cooperative international scientific satellites will also be expanded. In the unmanned lunar exploration programs, the emphasis in 1963 will be on the Ranger and Surveyor programs to land scientific instruments on the lunar surface and to collect detailed data from lunar orbiting spacecraft in support of the manned lunar landing program. Development of the Mariner series, designed to explore the planets Venus and Mars, will also continue in 1963 as well as effort on the preliminary design of advanced spacecraft for lunar and planetary exploration.

(b) *Launch vehicle development.*—In the development of launch vehicles for use in the unmanned scientific, technological, and space applications programs, major effort in 1963 will be devoted to continued development of the CENTAUR launch vehicle, which is now planned for use in the Surveyor and Mariner projects among others. Work will continue on the solid propellant SCOUT vehicle to improve its reliability and orbital accuracy. Development effort on the DELTA vehicle was largely completed in 1962.

4. *Space technology.*—This activity includes those programs designed to advance the technology required for the development and operation of space vehicles and related equipment.

(a) *Launch vehicles and spacecraft.*—Funds included provide for technical development in the spacecraft, launch vehicle, and launch operations fields to the point where the results can be used in flight programs. Major efforts in this area are conducted at the Langley Research Center, Hampton, Va.; Ames Research Center, Sunnyvale, Calif.; Lewis Research Center, Cleveland, Ohio; and Marshall Space Flight Center, as well as by NASA contractors.

(b) *Propulsion and space power.*—This activity includes the development of advanced propulsion and electric power techniques and systems for use in future space vehicles. In 1963 work will continue on the advanced liquid propulsion engines which are currently planned for use on the SATURN, ADVANCED SATURN, and NOVA launch vehicles. Major emphasis will continue to be placed on nuclear systems in joint programs with the Atomic Energy Commission. These include the development of a nuclear rocket under Project Rover for use in a launch vehicle and nuclear electric power systems under Project Snap. Effort will also be devoted to the development of small solid rockets for use in space vehicles, electrical propulsion systems, and battery, solar, and other electrical auxiliary power units used to operate sensors and telemetry equipment in spacecraft. Primary effort on these programs will be carried out at the Lewis Research Center and the Space Nuclear Propulsion Office, Cleveland, Ohio; the Marshall Space Flight Center, and the National Nuclear Rocket Development Center in Nevada.

5. *Aircraft and missile technology.*—This activity provides for basic and applied research on problems related to design, development, construction, and operation of aircraft and missiles. In 1963, expanded effort will be devoted to research on the supersonic transport project in cooperation with the Federal Aviation Agency and the Department of Defense. Work will continue on advanced military aircraft employing variable swept wings and on short and vertical takeoff and landing techniques. Also included under this activity are the advanced research and development related to projects which link techniques associated with aerodynamic flight with those applicable to space. The aircraft and missile technology effort is primarily carried out by the NASA Research Centers, Marshall Space Flight Center, and Wallops Station.

6. *Supporting operations.*—Included in this activity are funds for operating and improving the tracking and data acquisition networks of the NASA space flight programs at stations located throughout the world. General equipment improvements and renovations will enhance tracking and data acquisition capability through greater sensitivity, higher power, longer range, and improvement in the reliability and quality of data received. NASA's activities in this field are handled by the Goddard Space Flight Center, the Jet Propulsion Laboratory, and the Langley Research Center.

SUMMARY DISTRIBUTION OF FUND REQUIREMENTS

Mr. THOMAS. Gentlemen, turn to the very fine table on A2–1, if you will. This is really a work of art. You will notice this is by programs, with personnel services for the fiscal years 1961, 1962, and 1963. This table is well worth having and we will insert it in the record. The number of positions is in another table which we will come to in a moment.

(The page referred to follows:)

Summary distribution of fund requirements—Research, development, and operation

FISCAL YEAR 1961

Programs	Research and development program requirements	Institutional support	Personnel services	Total
MERCURY	$109,851,000	$4,804,991	$9,674,009	$124,330,000
Advanced manned space flight	5,265,000	351,263	649,737	6,266,000
SATURN C-1	119,085,000	16,325,221	38,497,779	173,908,000
ADVANCED SATURN		290,367	332,633	623,000
NOVA		144,909	152,091	297,000
Meteorological satellites	17,595,000	817,491	1,197,509	19,610,000
Communications satellites	31,206,000	1,031,803	1,595,197	33,833,000
Sounding rockets	8,250,000	1,716,746	2,363,254	12,330,000
Scientific satellites	35,468,000	8,170,236	10,759,764	54,398,000
Lunar and planetary exploration	85,797,000	2,086,559	3,135,441	91,019,000
SCOUT	5,950,000	1,461,042	2,240,958	9,652,000
DELTA	9,575,000	439,185	464,815	10,479,000
CENTAUR	62,575,000	1,162,830	935,170	64,673,000
Spacecraft technology	9,149,000	6,584,528	11,392,472	27,126,000
Launch vehicle technology	9,047,000	1,946,862	2,857,138	13,851,000
Launch operations development	100,000			100,000
Electric propulsion	3,391,000	1,362,360	2,410,640	7,164,000
Liquid propulsion	58,981,000	4,661,693	9,083,307	72,726,000
Solid propulsion	1,372,000	186,419	340,581	1,899,000
Space power technology	4,725,000	1,441,030	2,746,970	8,913,000
Nuclear systems technology	13,494,000	3,650,180	7,905,820	25,050,000
Aircraft and missile technology	980,000	14,399,269	22,477,731	37,857,000
Tracking and data acquisition	29,651,000	6,443,016	8,235,984	44,330,000
Total	621,507,000	79,478,000	139,449,000	840,434,000

FISCAL YEAR 1962

MERCURY	$54,433,000	$7,042,942	$6,802,058	$68,278,000
Advanced manned space flight	122,162,000	12,509,826	12,569,674	147,241,500
SATURN C-1	201,789,000	31,455,567	48,948,433	282,193,000
ADVANCED SATURN	21,500,000	3,972,623	2,289,377	27,762,000
NOVA	2,300,000	2,674,275	1,347,725	6,322,000
Meteorological satellites	50,816,000	1,782,802	1,711,198	54,310,000
Communications satellites	43,823,000	1,919,944	2,734,056	48,477,000
Sounding rockets	9,800,000	2,132,299	2,328,701	14,261,000
Scientific satellites	96,568,000	10,941,769	10,108,231	117,618,000
Lunar and planetary exploration	163,768,000	2,739,809	3,456,191	169,964,000
SCOUT	3,950,000	1,846,008	2,409,992	8,206,000
DELTA	2,755,000	51,731	120,269	2,927,000
CENTAUR	62,600,000	1,437,511	1,802,489	65,840,000
Spacecraft technology	17,796,000	7,365,626	11,983,374	37,145,000
Launch vehicle technology	14,523,000	3,456,227	5,100,773	23,080,000
Launch operations development	1,656,000	69,941	63,059	1,789,000
Electric propulsion	12,121,000	1,918,616	3,541,384	17,581,000
Liquid propulsion	90,226,000	5,163,812	8,511,188	103,910,000
Solid propulsion	3,424,000	401,980	471,020	4,297,000
Space power technology	7,175,000	3,159,188	4,309,812	14,644,000
Nuclear systems technology	34,266,000	6,927,783	9,040,717	50,234,500
Aircraft and missile technology	1,860,000	16,288,347	23,330,653	41,479,000
Tracking and data acquisition	70,884,000	11,680,374	12,279,626	94,844,000
Total	1,090,195,000	136,939,000	175,260,000	1,402,394,000

Summary distribution of fund requirements—Research, development, and operation

FISCAL YEAR 1963

Programs	Research and development program requirements	Institutional support	Personnel services	Total
MERCURY	$3,500,000	$4,880,170	$4,878,830	$13,259,000
Advanced manned space flight	800,933,000	27,442,823	35,252,177	863,628,000
SATURN C-1	170,000,000	33,001,367	46,235,633	249,237,000
ADVANCED SATURN	314,443,000	10,694,076	10,034,924	335,172,000
NOVA	155,000,000	5,763,536	2,810,464	163,574,000
Meteorological satellites	45,894,000	2,737,632	2,553,368	51,185,000
Communications satellites	79,624,000	2,542,427	3,210,573	85,377,000
Sounding rockets	13,571,000	2,786,242	2,799,758	19,157,000
Scientific satellites	145,532,000	15,424,301	14,208,699	175,165,000
Lunar and planetary exploration	263,433,000	4,696,230	5,430,770	273,560,000
SCOUT	4,200,000	2,373,874	2,373,126	8,947,000
DELTA		101,410	166,590	268,000
CENTAUR	60,000,000	3,052,496	3,611,504	66,664,000
Spacecraft technology	28,828,000	10,724,494	14,531,506	54,084,000
Launch vehicle technology	20,060,000	4,728,341	6,901,659	31,690,000
Launch operations development	20,177,000	637,994	671,006	21,486,000
Electric propulsion	21,218,000	3,977,264	5,451,736	30,647,000
Liquid propulsion	147,421,000	6,271,339	9,409,661	163,102,000
Solid propulsion	6,019,000	990,846	934,154	7,944,000
Space power technology	10,638,000	3,695,313	5,838,687	20,172,000
Nuclear systems technology	103,028,000	7,354,084	12,579,916	122,962,000
Aircraft and missile technology	4,905,000	20,730,508	26,952,492	52,588,000
Tracking and data acquisition	121,871,000	19,060,233	17,478,767	158,410,000
Total	2,540,295,000	193,667,000	234,316,000	2,968,278,000

SUMMARY OF PERSONNEL BY FUNCTION

Mr. THOMAS. Gentlemen, look at the position and personnel compensation shown in the table on page A 4–1. This is by program. You will notice it gives you the personnel total and for headquarters, the Western Operations Office, Langley, and the other installations. You can follow this all the way through each program and installation. There is really a wealth of information here. We will insert in the record the totals for each program, since the detail might become too voluminous.

(The material referred to follows:)

Summary distribution of personnel services—research, development and operation

	1961		1962		1963	
	Amount	Number of personnel	Amount	Number of personnel	Amount	Number of personnel
MERCURY	$9,674,009	1,195	$6,802,058	961	$4,878,830	561
Advanced manned space flight	649,737	78	12,569,674	1,708	35,252,177	4,056
SATURN C-1	38,497,779	4,502	48,948,433	5,448	46,235,633	4,967
ADVANCED SATURN	332,633	36	2,289,377	277	10,034,924	1,055
NOVA	152,091	16	1,347,725	165	2,810,464	288
Meteorological satellites	1,197,509	147	1,711,198	217	2,553,368	268
Communications satellites	1,595,197	191	2,734,056	346	3,210,573	339
Sounding rockets	2,363,254	310	2,328,701	303	2,799,758	322
Scientific satellites	10,759,764	1,341	10,108,231	1,281	14,208,699	1,495
Lunar and planetary exploration	3,135,441	379	3,456,191	428	5,430,770	589
SCOUT	2,240,958	282	2,409,992	310	2,373,126	280
DELTA	464,815	49	120,269	14	166,890	16
CENTAUR	935,170	109	1,802,489	207	3,611,504	389
Spacecraft technology	11,392,472	1,385	11,983,374	1,497	14,531,506	1,697
Launch vehicle technology	2,857,138	337	5,100,773	592	6,901,659	769
Launch operations development			63,059	7	671,006	72
Electric propulsion	2,410,640	278	3,541,384	458	5,451,736	633
Liquid propulsion	9,083,307	1,045	8,511,188	1,102	9,409,661	1,092
Solid propulsion	340,581	41	471,020	59	934,154	100
Space power technology	2,746,970	316	4,309,812	559	5,838,687	673
Nuclear systems technology	7,905,820	910	9,040,717	1,170	12,579,916	1,447
Aircraft and missiles technology	22,477,731	2,744	23,330,653	2,907	26,952,492	3,158
Tracking and data acquisition	8,235,984	1,053	12,279,626	1,564	17,478,767	1,887
Total	139,449,000	16,744	175,260,000	21,580	234,316,000	26,144
Reimbursements	4,104,000	333	3,044,000	300	1,317,000	129
Grand total	143,553,000	17,077	178,304,000	21,880	235,633,000	26,273

NASA FACILITIES

Mr. THOMAS. How many installations are there now? Who can detail that for the record?

Mr. WEBB. We have 10, including the Western Operations Office.

Mr. THOMAS. Detail them, please.

Dr. SEAMANS. I am looking at the Construction of Facilities book, page S–2. We have the Ames Research Center. We have the Atlantic Missile Range, which is now called the Launch Operations Center, under Dr. Debus; the Flight Research Center, the Goddard Space Flight Center, the Jet Propulsion Laboratory, the Langley Research Center, the Lewis Research Center, the Manned Spacecraft Center, the Marshall Space Flight Center. Those are the 10 that Mr. Webb referred to, shown on the chart.

Mr. THOMAS. You have not named them all. Keep going.

Dr. SEAMANS. In addition, we have the Michoud plant, the Mississippi Test Facility, the Nuclear Rocket Development Station——

Mr. THOMAS. Where is that?

Dr. SEAMANS. That is in Nevada, at Jackass Flats.

Mr. THOMAS. That is the old proving grounds.

Dr. SEAMANS. And the Pacific Missile Range. We have a small installation there.

Mr. THOMAS. You still overlooked one.

Dr. SEAMANS. That may be the case.

Mr. HOLMES. The Space Nuclear Propulsion Office at Cleveland is in the book.

Mr. FINGER. It is a joint AEC–NASA office.

Mr. THOMAS. You have not brought in Edwards Air Force Base.

Dr. SEAMANS. That is the Flight Research Center. Yes, sir; I mentioned that.

Mr. THOMAS. What is it, 13 or 14 all together?

Dr. SEAMANS. There are 14; 15 if you include the Space Nuclear Propulsion Office.

CONSULTANTS

Mr. JONAS. While you are talking about personnel, yesterday I asked for some information about consultants. Have you the material with you?

Mr. SIEPERT. The material I have at the present time, Mr. Chairman, is the individual consultants of the headquarters and all of the field, except Marshall and Goddard. Their report is being sent into us today. As a separate submission, we will have the consultants of the research committees which Dr. Seamans spoke of. I think you would want that for the record.

Mr. THOMAS. You have 12 of them, and normally there are about 12 to a panel, so there are about 140 or 150.

Mr. SIEPERT. We will insert the names.

Mr. JONAS. May we see the information you have with you now? We may ask questions on it.

(The material referred to was supplied to the Committee.)

Dr. SEAMANS. Mr. Chairman, we have a booklet which describes each of our field installations, if this will be of value to your committee.

Mr. THOMAS. I think we are all pretty well familiar with it. We wanted a list of installations in the record at this point and you have supplied that.

WESTERN OPERATIONS OFFICE

Mr. EVINS. You list your 13 or 14 field installations on page A 7–1, and then on page A 4–1, the big chart, you list only 3 or 4 divisions—Headquarters, Western Operations Office, and Langley. Why do you carry your Western Operations Office separately?

Dr. SEAMANS. The Western Operations Office is not a field center in the same sense as the other groups.

Mr. THOMAS. You have 125 employees there, Doctor.

Dr. SEAMANS. They are not actually taking project responsibility.

Mr. THOMAS. And you are paying $4.50 a square foot rent there, too.

Dr. SEAMANS. This Office was established to assist the other centers primarily in administrative matters associated with our projects on the west coast.

Mr. EVINS. The other centers report directly to the Administrator, and the Western Office comes through an Associate Administrator.

Dr. SEAMANS. The Western Office is shown in the lower right-hand corner of our organizational chart, reports directly to Mr. Siepert, the Director of Administration.

AUTHORITY OF CENTERS TO APPROVE CONTRACTS

Mr. EVINS. In the letting of contracts at one of your installations; they are approved immediately at the center, then come to Dr. Seamans, and then ultimately to Mr. Webb to be approved. Is that right?

Mr. WEBB. It depends on the size of the contract. The centers have authority to approve contracts up to a certain limit. Then the larger ones come up for review at headquaters.

Mr. EVINS. What is the limit?

Mr. WEBB. $100,000. That is not an absolute rule. Where there are important policy questions or other types of questions, they come up for approval even of smaller amounts.

Mr. SIEPERT. I might supplement that by saying the formal delegations to the field centers are at two levels.

Mr. EVINS. In other words, you have 14 men who have authority to make decisions up to what, $5 million?

Mr. SIEPERT. All decisions above $5 million are reserved to the Administrator.

Mr. EVINS. A decision lower than that can be made by one of 14 men?

Mr. WEBB. No. He is going to modify that answer.

Mr. SIEPERT. I need to answer it this way: The Marshall Center and the Western Operations Office have delegated authority to approve contracts up to $1 million. The other centers have authority to approve awards at the present time up to $100,000. All contracts of a greater amount than that must be approved by the Headquarters Director of Procurement and Supply.

Mr. THOMAS. That is Dr. von Braun and the Goddard Center, you say?

Mr. SIEPERT. Dr. von Braun and Western Operations have approval up to $1 million. But any of their contracts over $5 million cannot be awarded except by the specific action of the Administrator.

PROCESS FOR APPROVAL OF CONTRACTS

Mr. EVINS. Any contract under $5 million can be approved by one of 14 men?

Mr. SIEPERT. No. It can be selected and negotiated by——

Mr. EVINS. Who finally approves a contract for $4,500,000?

Mr. SIEPERT. A contract for $4.5 million will be negotiated by a field center such as Marshall——

Mr. EVINS. I know it will be negotiated, but who approves it?

Mr. SIEPERT. Marshall will negotiate and sign it, but the contract cannot be made effective until it comes in for a central procurement review in the headquarters. That procurement review is exercised by the Division of Procurement and Supply.

Mr. WEBB. If there is any question whatever about it, it will come on to Dr. Seamans, Dr. Dryden, and myself, and the three of us meet on the larger contracts and work together on all the major contracts.

Mr. EVINS. They are all, in effect, executed in the field, but ultimately reviewed and approved here?

Mr. WEBB. That is right.

Mr. EVINS. If there is no disagreement or no dissent, you automatically approve it?

Mr. WEBB. No, sir; we do not automatically approve it. On the larger contracts, above $5 million, where the center Director has the responsibility for evaluation, he comes in with his evaluation team. Dr. Dryden, Dr. Seamans, and I, along with the center Director and the program Manager, go through a thorough review with the evaluation team, of all the elements that they have gone through, and at the end of this very formal presentation by the evaluation team, we then give the center Director, who is to administer the contract, and the program Manager, whose funds and program are involved, an opportunity to state their views. Then we exclude them, and Dryden and Seamans and I go to work on the question of whether this particular contract should be approved, whether some changes should be made, and we make the final decision together. Even though I am personally charged with this, in every case I have asked these two gentlemen to sit with me, and the three of us go through this with great care to be sure we do the best job we can.

ADMINISTRATION OF CONTRACTS

Mr. EVINS. The Western Operations Office and the Marshall Space Flight Center operate on the same basis, and the others have a little different formula.

Mr. WEBB. That is right. Approximately the same. They are administering two different kinds of contracts, Congressman Evins. The Western Operations Office is an administrative office to help anyone who has contracts in that geographic area so people do not have to travel across the country in order to carry out the administrative work connected with those contracts. In the case of Marshall, by and large the contractors come to Marshall. This is a big operations center with between 5,000 and 6,000 people there, including experts. Marshall is an operating and research center. Western Operations Office does not have a research staff, it does not have operating people. They are a servicing office.

Mr. EVINS. This committee is trying to help you so that 5 or 8 years from now there will not be any investigation of some of these contracts.

Mr. WEBB. I appreciate that.

PROCEDURE FOR AWARDS OF CONTRACTS

As a matter of fact, we have a very careful procedure in the award of these contracts.

Mr. EVINS. It appears to me it is somewhat spread out when you have 14 different people who have authority to make decisions.

Mr. WEBB. Up to $100,000, and a very strong measure of authority with respect to larger amounts. Some of these contracts, you see, run into several hundreds of millions of dollars. These careful evalua-

tion procedures are gone through in the case of the big boosters under Dr. von Braun's direction, with people from headquarters and from all the segments of NASA who are involved on the evaluation committee. Then he comes up with his evaluation team to make the presentation. All of this is done through a very carefully worked out procedure which is prescribed in our regulations and field instructions, the process is checked by the Comptroller General of the United States, whose auditors police all this procurement. We operate under his rulings just as the rest of the Government does.

Mr. EVINS. All of your 14 regional field managers have uniform and strict standards and the same criteria to follow? You will not have one following one procedure in one place and another in another place?

Mr. WEBB. We have a carefully worked out set of procurement regulations under which everyone in this Agency works.

Dr. SEAMANS. One of the advantages of our organization is that the Administrative Office, under Mr. Siepert, works closely with each of the administrative offices in the centers so there will be this uniformity with regard to procurement practice, personnel, security, and other business administration matters.

SUPERVISION AND AUDIT OF PROCUREMENT

Mr. WEBB. The point I think you are getting at is that these men do not operate unsupervised. Under the General Manager, under the Office of Administration, there is a supervision continuously of how this procurement function is performed out in the field, and that, in turn, is audited by the Comptroller General.

Mr. SEIPERT. And by our own auditors.

Mr. THOMAS. Who heads your supervisory force, your evaluation force here in this country?

Mr. WEBB. It depends on the kind of contract, Mr. Chairman.

Dr. SEAMANS. We select an evaluation board for each one of the major procurements. As Mr. Webb indicated, there is both a technical and a business review. The actual make-up of these panels is approved by the Associate Administrator in every case.

Mr. EVINS. Whom do you generally select for these panels?

Dr. SEAMANS. We select for these panels both headquarters personnel and people from our centers, the people who are best qualified to judge a procurement from business and technical standpoints.

Mr. WEBB. I would like to say one other thing. We go out also to get the experience that other Government agencies have had with these contractors. One part of our evaluation is to find out how good a job they have done in the work with which they have been entrusted from anywhere in the Government.

DISTRIBUTION OF INCREASED EMPLOYMENT BY LOCATION

Mr. THOMAS. At this point in the record, let us turn to page A 6–6. This shows a breakdown of the increase in personnel at the headquarters and in the districts. NASA headquarters, 494. Western Operations Office, 6. That gives a total of about 125 in that office, does it not?

Dr. SEAMANS. Yes.

Mr. THOMAS. Can you not cut that down to about 50?

Langley Research Center, 372. Ames Research Center, 376. Lewis Research Center, 900. Flight Research Center, 56. Goddard Space Flight Center, 355. Manned Spacecraft Center, 1,060. Marshall Space Flight Center, 710. Wallops Station, 41. Space Nuclear Propulsion Office, 23. That gives a total increase of 4,393.

Now let us take the old installations—Langley, Ames, and Lewis. Why the increase? These three big laboratories have heretofore been primarily engaged in aerodynamics. At the three installations you have in the neighborhood of about 63 wind tunnels. What transformation is going on in each one of these laboratories to fit into your new program? That is one question.

The second question is, What part of their activities is devoted purely to the old program of aerodynamics and the use of the wind tunnels? How is that fitting into the space program?

LEWIS RESEARCH CENTER

Dr. SEAMANS. I will start, and then might have Dr. Silverstein add to what I have to say, inasmuch as he is the director and he is here with us today.

Mr. THOMAS. Let us have the doctor begin. What about it, Dr. Silverstein?

Dr. SILVERSTEIN. In the NASA program, 90 percent of which, as you indicated, is for outside contracting, it is important to remember the talent of the people we have in our research centers becomes available to the support of that program.

Mr. THOMAS. What is your personnel load now at the center?

Dr. SILVERSTEIN. The personnel at the center at the end of our current year will be 3,600 people.

Mr. THOMAS. What is it now, Doctor?

Dr. SILVERSTEIN. 3,550.

Mr. THOMAS. Go ahead.

Dr. SILVERSTEIN. The Lewis Center has recently been reorganized to provide support of this big program. We have been assigned responsibilities——

FUNCTION OF THE LEWIS CENTER

Mr. THOMAS. Under the old program, what was the function of the Lewis Center?

Dr. SILVERSTEIN. The Lewis Center has been the principal center within the old NACA organization and continuing in the NASA organization in the fields of propulsion and power—rocket engine systems using chemical fuels, rocket engine systems using nuclear energy sources, systems which are used for creating power for space, solar power or nuclear power. These are all programs within the Lewis Center, and the area within the NASA organization assigned the responsibility both for inhouse work and for contractual effort in this area of work.

Mr. THOMAS. You are taking on two almost brandnew programs. You have done some of that work in years gone by. Now you are going into intense research on electric propulsion and atomic energy propulsion. What about your reactors?

Dr. SILVERSTEIN. In support of requirements for advanced propulsion and power in space, it is very apparent that nuclear power will be required in the future. There are only so many energy sources available for power in space, of which one is solar power, one is nuclear power, and another is chemical power. Calculations quickly indicate that for long-term missions in space, such as, say, a space platform laboratory in space to be used as an observatory and for doing technical experiments in space, for the long-distance lunar and planetary missions, we shall need to use nuclear power.

CAPITAL INVESTMENT AT LEWIS

Mr. THOMAS. What is our capital investment in Lewis?

Dr. SILVERSTEIN. I think at the present time in Lewis, around $150 million.

Mr. THOMAS You have a capital investment item for almost $44 million for this year in addition to your capital investment there. Engineering building, $4.6 million; hydrogen heat transfer facility, $2.4 million; lunar propulsion research facility, $6.2 million; modernization and reconditioning of Plum Brook service for, $1.5 million. What are you going to do at Plum Brook? You do not even have it in operation yet, have you?

Dr. SILVERSTEIN. Yes, sir; it is definitely in operation.

Mr. THOMAS. That is your big reactor there?

Dr. SILVERSTEIN. There is a reactor there, plus the hydrogen test.

MODERNIZATION AND RECONDITIONING OF PLUM BROOK SERVICE FACILITIES

Mr. THOMAS. Where are you going to spend this $1.5 million at Plum Brook? In remodeling your hydrogen test facility?

Dr. SILVERSTEIN. You will recall that the facilities being currently transferred to us used to be a munitions depot. It was put up during the war. There are some 6,000 acres of land there which is crossed with roads. There is a railroad siding which comes in to the plant. The $1.5 million is an attempt to bring into operating shape many of the service areas.

Mr. THOMAS. What part of that tract is to be transferred to you?

Dr. SILVERSTEIN. All of it.

Mr. THOMAS. Will the Army keep any strings on it?

Dr. SILVERSTEIN. No. The Army is moving out completely from the area. The 6,000 acres are required to provide sufficient clear area around the facilities that have hazards in testing so we can operate such things as large hydrogen facilities where there is explosion hazard and nuclear reactor systems.

REACTOR AT PLUM BROOK

Mr. THOMAS. At Plum Brook you have a reactor. What is the capital investment to date in that reactor?

Dr. SILVERSTEIN. About $13 million.

Mr. THOMAS. Is it ready to go now?

Dr. SILVERSTEIN. Yes, sir. We received a letter just last week from the safety committee which approved the carrying of power up to full power.

Mr. THOMAS. You have been working on that how long now? Six or seven years?

Dr. SILVERSTEIN. Six and a half years. We have operated at lower power. It is now going up to full power.

SPACE PROPULSION FACILITY

Mr. THOMAS. You have quite a sizable item here in your space propulson facility, $25.5 million. That is brandnew. That is a part of your $43.8 million.

Dr. SILVERSTEIN. Yes. That is the facilities.

Mr. THOMAS. Tell us something about that. We have looked over the plans and diagrams and read all your description. How in the world did you arrive at this figure of $25.5 million?

Dr. SILVERSTEIN. Let me explain first what the facility is for. Quite clearly as we move ahead in space exploration, as I mentioned earlier, we shall require the use of nuclear energy in space for power.

Mr. THOMAS. You have that big reactor there, Doctor. What do you want with another one? You do not want another one there do you?

Dr. SILVERSTEIN. No. We are not building a reactor in this facility. This is a facility to test reactors in. The reactors are being created under other parts of this program.

For example, in the budget here, you will find funds allotted to so-called SNAP–8 program. The SNAP–8 program is a program which consists of a reactor development to provide 30 kilowatts of power, and hooked to it is a conversion system for taking 30 kilowatts of heat energy generated in the reactor——

Mr. THOMAS. Where are you going to put the installation?

Dr. SILVERSTEIN. It will go to Plum Brook. Actually, these facilities, whereas they appear to be expensive in initial investment——

Mr. THOMAS. What part of this $25.5 million is going to be spent on atomic energy work, and how are you going to spend it?

Dr. SILVERSTEIN. The propulsion facility outlined in this is a method of containing the system at space conditions so that it could be tested before flight. I think we all ought to be aware of the fact that before any of these space propulsion systems can be used in flight they have to be very extensively ground developed. This is really the key to actually creating successful systems that will be as complicated as these systems are. In the past, the reason NASA has been able to carry on successful programs that they have has been because we have done very carefully the work on the ground before we have flown.

DEVELOPMENT OF ATOMIC ENGINE

Mr. THOMAS. Doctor, are you not, in the final analysis, really picking up where the Atomic Energy Commission and the Air Force have been working out in Ohio on that installation for the last 9 years? You are going to do the same thing, are you not?

Dr. SILVERSTEIN. No, sir. There is a difference here.

Mr. THOMAS. What is the difference?

Dr. SILVERSTEIN. The ANP program is directed toward a specific mission assigned by the Air Force, and I think this ANP program has actually been canceled.

Mr. THOMAS. Not totally but almost; it took us 9 years to cancel it.

Dr. SILVERSTEIN. It is still being done. However, the difference is this——

Mr. THOMAS. In the final analysis, are you not going to set up a powerplant there? You are going to try to develop one, are you not?

Dr. SILVERSTEIN. We are going to have to.

Mr. THOMAS. You have atomic energy, and what you are going to do there is to develop an engine, and that is it, in the final analysis?

Dr. SILVERSTEIN. This is a very good way of saying it.

Mr. THOMAS. Do you know how much we have spent on this project out there so far in round figures?—a little bit more than $1 billion?

Dr. SILVERSTEIN. This is before the ANP program.

Mr. THOMAS. That is right.

Dr. SILVERSTEIN. The ANP program was competitive in the sense it was competing with our other powerplants for flight in the atmosphere. There is not much competition for nuclear power in space but on the ground we could use air-breathing engine systems to compete with nuclear systems. You do have an alternative in that you could go one way or the other.

Mr. THOMAS. As a result of that billion dollars that the Air Force and the AEC spent out in the other installation about 150 miles from your place, have they come up with anything that you can use?

Dr. SILVERSTEIN. Yes, sir.

Mr. THOMAS. This was a powerplant for an airplane?

Dr. SILVERSTEIN. The reactor technology under development for the last 10 years will apply. There are new requirements in this area, of course, such as a different cooling method but the basic work they did in the reactor calculations and all, all of this is in the literature and will be available. However, I see no chance for doing an adequate ground-based development job in this area if, in fact, we are going to continue to make progress in space development.

TESTING OF SYSTEM

Mr. THOMAS. Break down your $25 million. What is it primarily for?

Dr. SILVERSTEIN. It is primarily for testing, providing a means where we can test on the ground these very complicated systems that are made up of nuclear reactor systems that take the heat that the nuclear reactor generates and uses it to boil, let us say, a liquid metal, and then you go from that into a turbine that takes the boiling liquid metal, a vapor, and expands it into the turbine to take power out of it. You drive a motor to create electric power and take the electric power and put it into an electric propulsion engine or plasma engine to get the propulsion. This whole system needs to be tested on the ground before it is flight tested. If you try to flight-test it, using boosters that cost $25 million apiece, you would not learn enough in 10 flight tests by that treatment, costing $250 million, simply to boost them to make it worth while, whereas if we build the right sort of ground facilities and we can afford to pay a great deal more than this for them if we have to, we can do the sound development job and we can expect it will work.

Unless we follow that practice in our future work, although the time here is very important——

Mr. THOMAS. How long will it take to develop this?

Dr. SILVERSTEIN. It is about a 3-year job to build the facility and put it into operation. In the meantime, we have timed it so that it is coming along in the same time period, the development of this SNAP–8 or space power systems coming along. We are already working on the end of the system that is the propulsion end.

Mr. THOMAS. Tell us how you arrived at this figure here of $25.5 million.

Dr. SILVERSTEIN. The breakdown is shown on page CF8–F5 and is broken down as to A, B, C, and so on.

Mr. THOMAS. We want to know how you arrived at those figures. Who is your contractor?

Dr. SILVERSTEIN. We have been in the business of building facilities of this general type such as the 8-by-6 wind tunnels, the 10-by-10 wind tunnels, and the big tank system out at Lewis that costs $25 million and built over a period of years, and we have a staff with an average experience of about 20 to 25 years in the people who are doing this work.

Mr. THOMAS. Who is your contractor for this?

A. & E. CONTRACTS

Dr. SILVERSTEIN. Currently, we have an A. & E. contractor who is doing preliminary design, preliminary estimates, and that is the Kaiser Co. They are not the contractor for construction but this is an A. & E. contractor.

Mr. THOMAS. Have you already let the contracts?

Dr. SILVERSTEIN. We have let the contract for the A. & E.

Mr. THOMAS. Before you got the money?

Dr. SILVERSTEIN. This is part of the $10 million for advance design.

Mr. THOMAS. You are leapfrogging on us, Doctor.

Dr. SEAMANS. Last year we had an appropriation authorization of $10 million for advanced facility planning and design.

Mr. THOMAS. We do not like you to leapfrog like this.

Dr. SEAMANS. We can come in with better estimates and discuss them with your committee.

Mr. THOMAS. Your construction is the smallest part of this and I believe you allocated how much for that construction, $25 a square foot?

Dr. SILVERSTEIN. The construction of this is——

Mr. THOMAS. Which page is that on?

Dr. SILVERSTEIN. It is on page CF8–F6, the bottom half of that sheet.

Mr. THOMAS. This is $20 to a square foot and this other one is $40 a square foot, another is $18, and another is $15 a square foot. These costs are accurate?

Dr. SILVERSTEIN. These costs are quite accurate. This part of the estimate we had no difficulty with at all, but if you go through it, piece by piece, we know what the site development cost is because this type of estimating has been done over and over again. The difficult part in estimating this equipment is item D.

Mr. THOMAS. That is where the guesswork is, is it?

Dr. SILVERSTEIN. There is some guesswork here but we know, for example, what it costs to put in——

Mr. THOMAS. Are you going to let this on a competitive bid contract?

Dr. SILVERSTEIN. Yes, sir.

Mr. THOMAS. You do not have any competitors or bids on it, do you?

Dr. SILVERSTEIN. We have an A. & E. study going on and it will be completed by July 15 at which time——

Mr. THOMAS. Who are your architects and engineers?

Dr. SILVERSTEIN. Kaiser.

MARSHALL SPACE FLIGHT CENTER

Mr. THOMAS. Dr. von Braun, tell us about your operation. Be sure and give Dr. Haeussermann and Dr. Rees our highest regards and wish them well.

Last year the doctor was very modest and the year before last is when he hit that big lick of $27 million construction. This year he wants about $13 million.

What did you build with that $27 million, Doctor?

Dr. VON BRAUN. This was a variety of items, Mr. Chairman, which converted the left side of our static test tower to take on the SATURN C–1 booster. In the meantime, this has been completed and the test stand was activated about a year ago. The tower originally was used for IRBM's. The left side was converted for SATURN and that is where the SATURN first-stage development was conducted. This year we are proposing, among other things, to convert the right side of the tower because the testing operation is going into high gear and we need more test capability.

ADDITIONAL EMPLOYMENT

Mr. THOMAS. What about your personnel load? How many people do you have aboard?

Dr. VON BRAUN. We have about 6,500 people aboard and we are asking for 710, I believe, additional.

Mr. SIEPERT. 6,248 are now on duty. The yearend figure you are giving is 6,490.

Dr. VON BRAUN. That is the yearend figure.

Dr. SEAMANS. 6,248 was the figure for March 30.

Dr. VON BRAUN. These additional 710 people are needed mainly as a result of the President's commitment to put a man on the moon in this decade because it takes some doing.

Mr. THOMAS. That is an understatement, Doctor. It will take a whole lot of doing, will it not?

Dr. VON BRAUN. We have activated, in addition to the SATURN program, the so-called ADVANCED SATURN program.

Mr. THOMAS. Your activities have always been concerned with the space activity; as far as the old program is concerned, you did not participate in that, did you? That was purely an Army installation back in those days before the reorganization of the space agency?

Dr. VON BRAUN. Yes; we joined the NASA family on the 1st of July 1960 and prior to that our participation was limited to the use of military rockets for some phases of the space program, particularly the early Explorer satellites.

ARMY FACILITIES AT MARSHALL

Mr. THOMAS. What part of the whole compound is the Army using?

Dr. VON BRAUN. Areawise the Army still has most of the land and this is a 40,000-acre area and Marshall has a 99-year deed for about 1,500 acres.

Mr. THOMAS. You have the docking area and all of the land?

Dr. VON BRAUN. We share with the Army a docking facility on the Tennessee River but that is just limited to the site needed to put the boosters on the barge for shipment to Cape Canaveral.

Mr. THOMAS. Two years ago you got some extensions to one or two of your office buildings, too?

Dr. VON BRAUN. That is presently under construction.

Mr. THOMAS. When will they be completed?

Dr. VON BRAUN. Beneficial occupancy will occur around December of 1962. This building does not give us any additional floorspace since we will turn the present office space back to the Army. The Army is in desperate need of office floorspace which we are presently occupying so we will simply move into that new building and turn our present office space back to the Army. We are not gaining any floorspace and it is for this reason that an additional wing office building is in the 1963 request.

SUMMARY OF MARSHALL CONSTRUCTION COSTS FOR 1963

Mr. THOMAS. Put page CF10–A1 in the record from volume 2, "Construction facilities."

(The page referred to follows:)

Construction of facilities, 1963 program—Marshall Space Flight Center

Addition to computation division building	$1,255,000
Components test facility	4,000,000
Components and subassembly acceptance building	950,000
Engineering and administration building	2,500,000
Expansion of instrumentation systems in west area	4,000,000
F–1 engine test stand	4,500,000
Hydraulic test facility	340,000
Low temperature facility	575,000
Modification of west side of static test stand	2,000,000
Engineering building	1,000,000
Instrument laboratory	2,000,000
Support facilities in west area	7,800,000
Utility installations	2,517,000
Total	33,437,000

NEED FOR STATIC TEST FACILITY

Mr. THOMAS. This shows that in the construction program you want $33,437,000 and the breakdown is in 12 or 14 categories. The big item is in "Support facilities" in the amount of $7.8 million and that is in addition to your test stand?

Dr. VON BRAUN. Yes, sir.

The situation here is the following: With the commitment to go ahead with the ADVANCED SATURN, we needed most urgently a static test facility for this new 5–F–1 engine booster of 7.5 million pounds of thrust. This thing is five times as powerful as our present

SATURN booster and this static tester must be supported by a single engine test stand on which engines can be tuned up before they are mounted in the assembly, the cluster. This item you were just referring to was the expansion of instrumentation system in the west area involving all the facilities, the instrumentation support, and the data center in support of these new test stands.

Mr. THOMAS. Incidentally, when are you going to have your original SATURN ready to go?

Dr. VON BRAUN. The first flight took place in October 1961 and was successful. The second is presently sitting on the pad and is scheduled to be launched a week from today.

Mr. THOMAS. You really got ahead of your schedule there about 6 or 8 months, did you not?

What is the thrust of that big one?

Dr. VON BRAUN. 1.5 million pounds.

Mr. THOMAS. How many engines do you have in it?

Dr. VON BRAUN. Eight.

Mr. THOMAS. Is it possible to remodel your test stands to take care of your new activities in your ADVANCED SATURN?

Dr. VON BRAUN. The new ADVANCED SATURN will be five times as powerful and requires a new test stand. This is an order of magnitude.

Mr. THOMAS. You just could not use the old one in any way, shape, form, or fashion?

Dr. VON BRAUN. No, sir.

DIFFERENCE BETWEEN SATURN C–1 AND SATURN C–5

Mr. OSTERTAG. Doctor, is your system designed to take the SATURN and increase the power or the thrust on each test?

Dr. VON BRAUN. No, sir.

Mr. OSTERTAG. What steps are you taking there?

Dr. VON BRAUN. We have the so called SATURN C–1 and then the ADVANCED SATURN or the SATURN C–5. These are two fundamentally different vehicles and they only share the name SATURN. The SATURN C–1 has 1.5 million pounds of thrust and can carry a little over 20,000 pounds of payload in orbit. The SATURN C–5 has 7.5 million pounds of thrust, five times as much, and can carry over 200,000 pounds into orbit. This is 10 times as much as the small model.

Mr. OSTERTAG. What is the basic difference between them?

Dr. VON BRAUN. Essentially size and power. The ADVANCED SATURN is five times as heavy and ten times as powerful as the little one.

Mr. OSTERTAG. As you move ahead, you are stepping up the power each time?

Dr. VON BRAUN. No; the small one has one objective and that is to develop a rocket with 1½ million pounds of thrust and the objective of the large one is to develop another rocket with 7.5 million pounds of thrust. It is like having a small airplane and a large airplane.

Dr. SEAMANS. They use entirely different engines.

Dr. VON BRAUN. The large SATURN has five engines, each of which has as much thrust as the entire cluster of eight little engines in the smaller one.

Mr. OSTERTAG. In other words, this is not necessarily stages in the development, but it is actually development for different purposes?

Dr. SEAMANS. They are two separate and distinct elements. The ADVANCED SATURN benefits from the work done on the SATURN C–1.

APOLLO SPACECRAFT

Dr. VON BRAUN. The area where the two are tied together is in the APOLLO flight mission. We will use the small SATURN to hurl the APOLLO command module and service module or spacecraft into an orbit around the earth. The large SATURN will be used to put a man on the moon and that is a far more demanding mission.

Mr. OSTERTAG. Which one?

Dr. SEAMANS. The large one.

Mr. OSTERTAG. What size will that be?

Dr. SEAMANS. The ADVANCED SATURN will generate five times as much thrust in the first stage as the C–1; 7.5 million pounds. They both serve the APOLLO project and the C–1 serves the initial phase of the APOLLO project, that is, orbital flights of the APOLLO spacecraft, and the C–5 which will follow a few years later will use that same APOLLO spacecraft for lunar flights.

COST OF SATURN C–1

Mr. THOMAS. What do your SATURN costs come to now?

You have it ready to go now and what is a good round figure? You originally estimated it would cost $1 billion.

Dr. SEAMANS. I think we must distinguish between the research and development and what it costs to duplicate a SATURN.

Mr. THOMAS. What do you have tied up in the original one including your research and development, test stands and everything? What is a good round figure?

Dr. SEAMANS. Three-quarters of a billion dollars.

Dr. VON BRAUN. I would say that is it.

Mr. THOMAS. You used a figure of $1 billion a year and a half ago.

Dr. SEAMANS. They still have a couple of years to go on that SATURN.

Mr. THOMAS. Not on the original SATURN.

Dr. SEAMANS. The first development of the SATURN is considered to be the firing of 10 vehicles. We still have several years to go before we get through the 10th.

Mr. BOLAND. Do you need the 10th?

Dr. SEAMANS. Yes, sir.

Mr. OSTERTAG. Is the SATURN C–5 the end product of your large SATURN?

Dr. VON BRAUN. Yes, sir; it is the most powerful that bears the name "SATURN." We have a project even more powerful than that but it has not reached the hardware stage yet, with the exception of the engine development. That is what we referred to as "NOVA."

Mr. BOLAND. There are only two?

Mr. THOMAS. $12 million?

Dr. VON BRAUN. Yes, sir. There is a SATURN C–1, a small one, and then there is a big SATURN C–5.

Dr. SEAMANS. The NOVA is also budgeted in 1963.

Mr. THOMAS. How much do you have in your research and development for your SATURN C–1? That is the one we want now.

Mr. HOLMES. About $750 million.

Dr. VON BRAUN. $119 million in 1961 for SATURN C–1; $201 million in fiscal year 1962 and this year we have $170 million for SATURN C–1, not counting the prorated installation, support, salaries, and wages.

COST AND COMPLETION DATE OF SATURN C–5

Mr. THOMAS. What is it going to be in the way of a wrap-up figure on your big one, the SATURN C–5 with 7.5 million pounds thrust?

Mr. HOLMES. We told the House authorization committee about $1.5 billion for the 7.5 million pound thrust vehicle.

Mr. THOMAS. It is going to be perfected when? The total cost will be $1.5 billion but how long will it be before you get it perfected?

Dr. VON BRAUN. 1965.

CONTRACTORS FOR SATURN, APOLLO, AND NOVA

Mr. THOMAS. Who are the contractors?

Dr. VON BRAUN. We have the Boeing Aircraft Co. for the first stage and North American Aviation for the second stage, and the Douglas Co. for the third stage.

Mr. THOMAS. Who is your contractor on your original SATURN?

Dr. VON BRAUN. The Chrysler Corp. for the first stage and the Douglas Aircraft Co. for the second stage.

Speaking in terms of dollars, one should not forget that a good portion of the dollar value goes to the engine contractors and the North American Co. is our main source because they developed the powerful F–1 engine that provides the thrust boost for the advanced SATURN first stage, and also the NOVA first stage. Then, again, we have the Rocketdyne Division of North American in both cases, the development of the J–2 engine, liquid hydrogen and oxygen and the 200,000-pound thrust engine for the advanced SATURN, second stage.

Mr. THOMAS. Where are they domiciled?

Dr. VON BRAUN. In Los Angeles. There are two separate divisions, the Rocketdyne Division in the rocket engine development business and the Space Systems and Information Division located in Downey, which now holds both our second stage contract for the advanced SATURN and also the APOLLO contract for the Manned Space Craft Center.

I forgot to mention one more engine under development just recently and that is the M–1 engine for the second stage of NOVA. It has 1.3 million pounds rating and I think it is listed here as 1 million. That is because that is a nominal thrust rating which we gave, but it has a growth potential up to 1.3 and that went to Aerojet.

Mr. THOMAS. You mean the one engine alone has that much thrust?

Dr. VON BRAUN. Yes, sir.

Mr. THOMAS. What is the fuel used?

Dr. VON BRAUN. Liquid hydrogen and liquid oxygen.

Mr. OSTERTAG. How many engines would you have to achieve that capability?

SIZE AND POWER OF ADVANCED SATURN

Dr. VON BRAUN. The advanced SATURN has five engines in both stages, five F–1's of 1.5 million in the first stage and five of the 200,000 pounds J–2 engines in the second stage. It has a total of 7.5 million pounds in the first stage and 1 million pounds in the second stage.

Mr. THOMAS. How long is that barrel going to hold it and how high is it?

Dr. VON BRAUN. The advanced SATURN is almost 300 feet, or in some cases, 265 feet. It depends a bit what space craft configuration is used on the upper end.

DEVELOPMENT OF SATURN–C–1

Mr. EVINS. Dr. von Braun, how many SATURN's have you perfected, completed, and launched?

Dr. VON BRAUN. One of the small SATURN's so far; the second is on the launch pad right now and ready to go.

Mr. OSTERTAG. Is that a large SATURN?

Dr. VON BRAUN. No, that is the original SATURN.

Mr. HOLMES. I ought to correct this "ten" impression. Ten is somewhat an arbitrary figure to get through the development. The total number will be a lot more than ten.

Mr. OSTERTAG. This is just the beginning then?

Mr. HOLMES. Yes, sir.

Mr. EVINS. This is the SATURN–C–1?

Dr. VON BRAUN. Yes, sir.

Mr. EVINS. Is that the same as the NOVA?

Dr. VON BRAUN. No, sir. It is a smaller vehicle that has five F–1 engines in the first stage and NOVA will have at least eight.

Dr. SEAMANS. It is important to realize in this development process each one of these SATURN's is not exactly the same as the others. The first one we fired had an active first stage, but it did not have an active second stage. You will not actually get to an active second stage until the fifth vehicle.

Mr. EVINS. Do not all of your contractors pretty much perfect all of your requests, all of your designs, all of your suggestions and ideas after you have told them what you want?

Dr. VON BRAUN. We have a very intimate relationship established in the technical area with our contractors. In all major technical decisions we get complete agreement first which is reached between our men and the contractor's men before we give him the go-ahead to cut hardware.

We learned the hard way in a new area like this that it is very essential to clearly appraise the problems before you charge ahead and run headlong into unforeseen difficulties.

Mr. EVINS. Do you have duplicate testing? Do you do the testing or do you leave it all to your contractor?

Dr. VON BRAUN. We do both. For example, on the advanced SATURN the first test stand would be located at Marshall and would be operated jointly by the Government and contractor personnel and a second test stand will go up in the Mississippi Test Facility which will be solely contractor-operated. We will just monitor the data produced on the test stand.

NEED FOR AND OPERATION OF MISSISSIPPI TEST FACILITY

Dr. SEAMANS. May I add to that? By establishing a test facility in Mississippi near the Michoud plant in New Orleans where all of these large stages in the future will be brought and tested by our contractors, NASA insures that these facilities will be used on a continuing basis by whatever contractors we select to work with us as time goes on.

Mr. BOLAND. May I ask, what can you do with the Mississippi Test Facility that you cannot do at the Marshall Center if you are given the money for your support facilities in the west area at Huntsville?

Dr. VON BRAUN. The problem is as follows: As far as the Mississippi test facility is concerned, we are only now in the process of acquiring the land. Since this is completely undeveloped land, it takes some time to first develop utilities, build roads, provide power, water, and so forth. Anything we can build in Mississippi is about 18 months later than what we can build in Huntsville where we have the basic utilities and where we have the data centers.

It is for this reason that, under the existing time pressure and in order to put that man on the moon in this decade, we had to build the first test stand in Huntsville. This gives the Government agency a much better handle on program administration, because our own men have a much better chance of familiarizing themselves with the problem. This is a very difficult thing.

Otherwise, in a contract such as this, to take the contractor's word for something without any way of developing your own judgment——

Dr. SEAMANS. It must be recognized that on a long-term basis these large boosters can only be transported by barge or ship. The only access to Huntsville is by using the Mississippi, Ohio, and the Tennessee Rivers and going through locks. We feel it is essential to have a test facility on the gulf coast near Michoud for easy transportation back and forth from the fabrication plant to the test facility. In addition, this location will permit the team of people who are responsible for this development to travel back and forth between Michoud and the test facility with relative ease.

Mr. BOLAND. What are you going to do with all of the test facilities you are going to construct in the west area at Marshall after you have completed the Mississippi test facility?

Dr. VON BRAUN. As Dr. Seamans just pointed out, the Mississippi test facility is a production and acceptance facility where boosters which are manufactured by Boeing in the Michoud plant in New Orleans will be static tested before they are shipped to Cape Canaveral. The Huntsville facility is where the basic development would be carried out so that we would know the flight hardware is really functionally correct and working——

Mr. BOLAND. But are you not really going to test the SATURN-C–5 at the test facility in the west area at Huntsville?

Dr. VON BRAUN. Yes, sir; but even after——

Mr. BOLAND. Where do you have most of this with respect to Dr. Seaman's description on transporting these large vehicles by barge? Is that what you have to do in the first test step at Huntsville?

Dr. SEAMANS. For all systems tests at Huntsville, they have the large installation up there for that purpose.

Dr. VON BRAUN. I think we should remember that no large rocket, even the military rockets, has ever been developed where, in addition to an acceptance test stand, the production vehicle was tested as a matter of routine. Also, there was a research development test stand in support of the operation to really work out the kinks in these birds. Even after the SATURN hits the flight stage, there will be continuous technical deficiency reports coming back from Cape Canaveral that must be worked out.

NATURE OF TESTING AT MISSISSIPPI FACILITY

Mr. THOMAS. If I might interrupt. Clarify for all of us this one simple statement: This new facility that you are figuring on building in Mississippi is for the testing of individual units, is it not?

Dr. VON BRAUN. Yes, sir. The complete booster comes out of the Michoud plant and goes to the Mississippi Facility.

Mr. THOMAS. Do you test it as a completed unit or do you test it at Mississippi, each one of the five separate engines before you put it in the cluster?

Dr. VON BRAUN. Only as a complete unit. There is a static test stand for a single engine adjacent to this but only to tune up an engine in case the test is not satisfactory.

Mr. THOMAS. Mr. Boland asked why you needed two of them.

Dr. SEAMANS. I think that is a fairly straightforward answer. The research and development testing, the early testing will be at Huntsville, while the testing of these stages in volume, as one every month, will be done at Mississippi. We will be firing SATURN at about that rate.

TESTING AT HUNTSVILLE AND MICHOUD

Mr. BOLAND. Are you actually going to test the SATURN–C–5 at the new facilities you request for 1963 in the west area of Huntsville?

Dr. VON BRAUN. That is correct.

Mr. WYATT. The first five SATURN's are expected to be tested there.

Mr. BOLAND. What use are you going to have for all of this equipment? You need the money, I have no doubt about that, but if we are going to give you $7.8 million to improve the facilities in the west area of Huntsville, what are you going to do with this area after you have developed and built the new test facility in Mississippi?

Dr. VON BRAUN. Practical experience bears out that there is a continued need for a research and development facility in order to improve the product. For example, the ATLAS has more than 105 flights by now and there are still several research and development test stands in full operation to date to make a better ATLAS. It is continuously necessary to have a facility where reports from Cape Canaveral can be cranked in to work out the kinks. That is what we continue to need it for.

This work will be continued to be done in Huntsville because the Michoud test stand, the Mississippi stand, will be busy as Dr. Seamans just pointed out.

Mr. BOLAND. The problem you have is that you seem to be duplicating the same work in both areas. Here we are putting up a fa-

cility in Mississippi and we are approving the one at Huntsville. I was under the impression you were going to test in both areas, and I wondered why we should have both areas going at the same time. You indicated that this gives you at least a 17-month leadtime, but I do not know that this is too important.

Dr. VON BRAUN. Maybe I should express myself a little differently. You need two test stands, anyway, a production stand and a research and development stand.

Mr. THOMAS. In other words, a process of evolution, is that what you are saying?

Dr. VON BRAUN. Yes, sir; one for quantity acceptance testing and the other for continued research and development.

In principle, both could be in Mississippi but we found it more advantageous to put it at Huntsville because of the 18-month leadtime we have at Huntsville.

Mr. HOLMES. Both that and the leadtime are important. It is my opinion that the next is going to be the big booster.

Mr. BOLAND. I do not know that the leadtime is so important.

Mr. HOLMES. It is, if you want to get to the moon first.

Dr. VON BRAUN. We are not paying a penny more for putting it in Huntsville.

Mr. BOLAND. Yes; but we are paying a great deal more pennies because we are trying to do it first; there is no doubt about that in your mind, is there?

Mr. HOLMES. There is no doubt in our minds that if we did not do it in this decade, it would not be so expensive or would it be so expensive if we delayed it 10 or 15 years?

CONTRACTORS FOR SATURN AT MICHOUD

Mr. EVINS. All of your inventions and discoveries are under contract with private contractors and are ultimately to be brought to the Michoud Plant and then to the Mississippi facility for testing?

Mr. HOLMES. Not all of them. The Michoud Plant will be shared between Boeing and Chrysler Cos., both building first stages. Chrysler's first stage is for the small SATURN and Boeing for the large one.

Mr. EVINS. You are planning for most of the testing to be done at the new facility when completed?

Mr. HOLMES. Yes, sir.

Mr. BOLAND. The actual launching will be at Cape Canaveral?

Mr. HOLMES. Yes, sir.

TRANSPORTATION OF VEHICLES

Mr. EVINS. You are presently able to take your SATURN by barge from Huntsville, down the Tennessee, to the Mississippi, through New Orleans, to the cape?

Mr. HOLMES. Yes, sir. That is what we are doing now.

Mr. EVINS. Are your docking facilities adequate, or large enough for present plans, or do they have to be enlarged for the future?

Mr. HOLMES. They are large enough to handle vehicles up to the size of the SATURN C–5 quite easily.

Mr. EVINS. You could not transport them by the present superhighways?

Mr. HOLMES. No, sir. The SATURN C–5 is 33 feet in diameter.

Mr. THOMAS. You could not even get them into this room, could you?

Dr. VON BRAUN. No, sir.

Mr. HOLMES. At Michoud we have this 40-foot headroom and the engines stick out on the dolly.

Mr. BOLAND. How far is the Michoud plant from Huntsville?

Dr. VON BRAUN. It is approximately 500 miles by air and 850 miles, if I am not mistaken, by river, because we have to go down the Tennessee and Ohio Rivers.

Mr. BOLAND. How far are you from the Mississippi test facility, 15 or 16 miles?

Dr. VON BRAUN. It is more than that; about 35 from our Michoud plant to the test site.

Mr. EVINS. Is the NOVA going to be developed along the same lines as the SATURN C–5?

Dr. VON BRAUN. Yes, sir. There is no other choice but to static test the NOVA at the Mississippi test facility, because barge transportation is the only feasible method. That means that the assembly facility must also be nearby, within 30 or 35 miles. It does not necessarily follow that most of the dollars are being spent in that same area, because assembly——

SUCCESS OF MANNED LUNAR FLIGHT

Mr. EVINS. Dr. von Braun, you helped our country forge ahead rapidly in a situation where we were behind to a point where we now feel some sense of excellence. Are you recommending putting man on the moon? Do you feel that this can be achieved?

Dr. VON BRAUN. Yes, sir. I am convinced it could be done with your support.

PROJECT MERCURY

Mr. THOMAS. Let us take a look at your MERCURY project. Put in pages RDO 1–1 and RDO 1–2

(The pages referred to follow:)

MERCURY

Summary of requirements

	1961	1962	1963
Advanced technical development	$2,737,000	$2,258,000	
Flight program	121,593,000	66,020,000	$13,259,000
Total	124,330,000	68,278,000	13,259,000

OBJECTIVES

Project Mercury is the initial step in the NASA manned space flight program. The objectives of this project are to determine man's capabilities in the space environment and to develop the technology required for manned space flight missions.

JUSTIFICATIONS

All preliminary steps leading up to manned orbital flight were successfully completed by the end of calendar year 1961. These steps included the manned suborbital flights by Astronauts Shepard and Grissom, which qualified the basic flight systems in the space environment; a single-orbit mission of an instrumented spacecraft; and a two-orbit mission with the chimpanzee, Enos, in the spacecraft. The orbital flights tested all of the spacecraft systems and the ground tracking and data acquisition systems.

Fiscal year 1963 funding is required for the last flights of Project Mercury. In the final Project Mercury missions, a manned spacecraft will be placed into earth-orbit, will circle the earth for three orbits, and will return to earth. The first of these missions is planned for fiscal year 1962 with several successive manned orbital flights extending into fiscal year 1963. Funds requested will provide for contractor support at Cape Canaveral, recovery operations conducted by the Navy, meteorological support provided by the U.S. Weather Bureau, flight monitors at the worldwide tracking network stations, and the acquisition and analysis of flight data and results.

Funding requirements

	1961	1962	1963
Advanced technical development	$2,737,000	$2,258,000	----------

With the planned completion of Project Mercury in fiscal year 1963, no additional advanced technical development funds will be required for this project.

Flight programs	1961	1962	1963
Capsules, equipment, and services	$60,474,000	$30,215,000	$7,569,000
Tracking, data acquisition and control network	25,254,000	----------	----------
Flight operations	----------	4,091,000	2,490,000
Recovery operations	5,029,000	12,833,000	3,200,000
Launch vehicles	30,836,000	18,881,000	----------
Total	121,593,000	66,020,000	13,259,000

CAPSULES, EQUIPMENT, AND SERVICES

Fiscal year 1963 funds are required to support the effort of the MERCURY spacecraft contractor (McDonnell Aircraft Corp.) through the completion of the project. Funds will primarily be used for contractor effort in the preparation of each spacecraft prior to flight.

TRACKING, DATA ACQUISITION, AND CONTROL NETWORK

Fiscal year 1961 funds for the procurement, installation, testing and operation of the Project MERCURY tracking, data acquisition, and control network were included in this category. Completion, modification, improvement, and operation of the network in fiscal year 1962 and fiscal year 1963 are now funded in the tracking and data acquisition program.

FLIGHT OPERATIONS

Fiscal year 1963 funds will support the remaining MERCURY manned orbital flights currently planned for that year. Included in this category is the support by the U.S. Weather Bureau for meteorological services, the services of flight monitors at worldwide tracking stations, and the acquisition and analysis of flight data.

RECOVERY OPERATIONS

These funds will provide for reimbursement to the U.S. Navy for their services in recovering the MERCURY spacecraft. Recovery support is provided not only in the eight primary recovery areas in the Atlantic Ocean but also on a contingency basis around the entire world.

STATUS OF MERCURY PROJECT

Mr. THOMAS. This is quite an expensive operation. You had $124,330,000 in 1961, $68,278,000 in 1962, and for 1963, $13,259,000. What is the status of Project MERCURY? Is this the initial step in the manned space flight program?

Dr. SEAMANS. As you know, we have had one very successful orbital flight with Col. John Glenn. We have four more MERCURY flights scheduled for this year, if required. We are not going to carry out a flight unless we learn something important, either scientifically or operationally. These flights are funded out of this figure of $13,259,000.

Mr. THOMAS. This is for improvement on your capsules?

Dr. SEAMANS. The techniques we are using for operation, further effort in the area of piloting the craft, and a better understanding of human factors.

RECOVERY OPERATIONS

Mr. THOMAS. What is the figure of $3.2 million?

Dr. HOLMES. That is what we pay the Navy for their expenses over and above the normal ship operations in doing our recovery work.

Mr. THOMAS. How many more flights? What is the $3.2 million figure set out for?

Mr. HOLMES. It is going to cover a minimum of three flights, perhaps four, as Dr. Seamans said. The MA–7 is the next one presently scheduled in May and then there are two others, and possibly a third, making a total of four scheduled in 1963.

Mr. THOMAS. You mean the Navy charges you about $750,000 a recovery?

Mr. HOLMES. Well, this number has personnel services and institutional support in it. Their charge is not that high, no.

COST AND USE OF CAPSULES

Mr. THOMAS. What is your breakdown on this $7.5 million for your capsules?

Mr. HOLMES. That is primarily McDonnell expense on the capsules themselves; preparation of the capsules which is about a 6-month operation for each one, at the cape. Once it is manufactured, there is preflight checking, testing, and putting in the latest designed modifications.

Mr. THOMAS. Are you going to use new or different capsules than the astronauts used not long ago?

Mr. HOLMES. In this budget the 18 orbits are properly stated as 1-day missions which come under the next tab, advanced manned space flight. Using this MERCURY capsule with a greater life support system, greater power supply system, this would fly early next year. The four capsules here are essentially the same, with modifications to improve reliability.

You remember I discussed with you here the switch which signals the condition of the heat shield, but nothing basic, Mr. Chairman.

Mr. THOMAS. Do you use a capsule more than one flight after you recover it? Can it be used again?

Mr. HOLMES. We do not plan to use it more than one flight in a manned operation, no. We have flown capsules more than once in experimental unmanned operations.

Mr. THOMAS. What is the total cost for your capsule to date?

Mr. HOLMES. You mean including the development?

Mr. THOMAS. Research and development.

Mr. HOLMES. Per capsule?

Mr. THOMAS. Yes.

Mr. HOLMES. I think it comes to something between $4 and $5 million, spreading the research and development across the present total number of something like 12.

Mr. THOMAS. It is more than that, is it not?

Mr. HOLMES. I do not believe so.

Mr. THOMAS. You have construction costs in addition to that?

Mr. HOLMES. I am just talking about the capsule, the McDonnell fabrication of the capsule. I believe that is a fair figure, $4 to $5 million per capsule.

Mr. THOMAS. You have $7.5 million set up for it. Are those new ones?

Mr. HOLMES. Those are new ones.

Mr. THOMAS. How many do you get for that?

Mr. HOLMES. Within that, there are four. In other words, I cannot say what the research and development on those four would be. You have to go back and look at what happened.

Mr. THOMAS. What was your base figure? What was your base year, 1961, in research and development?

Mr. HOLMES. Yes, sir.

Mr. THOMAS. $60 million?

Mr. HOLMES. Yes, sir.

Mr. THOMAS. You did not get a finished product?

Mr. HOLMES. No, sir.

Mr. THOMAS. That was all research and development?

Mr. HOLMES. Correct.

Mr. THOMAS. After you spent your research and development money, this figures out that you can get them completed for what?

Mr. HOLMES. If you add it all, all those three together, you get 15 capsules out of this; and you get $97 million. That would be something over $6 million apiece, I think.

Mr. THOMAS. Now you are going to buy four for $7.5 million?

Mr. HOLMES. No; but they are already built a good part, under the $30 million. In other words, I cannot give you an accurate figure without adding the three together and say that this gives you 15 capsules plus some other services. It is incremental funding, as you well know.

Dr. SEAMANS. The last vehicle was entirely paid for in 1962 even though we are using some of them in 1963.

ADVANCED MANNED SPACE FLIGHT

Mr. THOMAS. Let us turn to page RDO–2–1.

Put pages RDO–2–1, –2, –3, –4, and –5 in the record.

(The pages referred to follow:)

ADVANCED MANNED SPACE FLIGHT

Summary of requirements

	1961	1962	1963
Manned spacecraft technology	$2,020,000	$14,952,000	$11,764,000
Aerospace medicine	4,246,000	17,244,000	19,320,000
Flight program		115,045,500	832,544,000
Total	6,266,000	147,241,500	863,628,000

OBJECTIVES

To carry out the manned exploration of space, and to develop man's capability to perform effectively in the space environment. As the major step in the present program, to achieve a manned lunar landing and return to earth.

JUSTIFICATION

Despite impressive accomplishments and improvements in instrument design, precision, and reliability, the most significant achievements in space will result from man's presence in the space environment. Man's unique ability to make critical decisions, to observe, and to reason cannot be duplicated, even by the most advanced technical systems.

The first major step in manned space exploration will be a mission to land man on the moon and return him safely to earth. As the President stated in May 1961, the earliest achievement of such a landing is one of this Nation's goals. The advanced manned space flight program is designed to take advantage of the experience and information gathered from each successive step in the overall program which includes Project MERCURY, Project GEMINI and Project APOLLO.

Project MERCURY was planned as the initial effort in the U.S. manned space flight program. The project, through the ballistic suborbital flights of astronauts Shepard and Grissom, has already provided fundamental data on man's reaction to zero gravity and his ability to perform effectively in the space environment. By the end of fiscal year 1962, Project MERCURY will have provided detailed information on man's capabilities in a weightless state for periods of up to 4½ hours.

As the next step in manned space flight, and in order to take maximum advantage of the successful Project MERCURY experience, MERCURY capsules are being modified to accomplish manned missions of 1-day duration. These missions will make maximum use of the MERCURY system and will expose man to considerably extended periods in the space environment.

Project GEMINI, which will follow the manned 1-day flights, is based on the decision made in fiscal year 1962 to initiate the development of a rendezvous-in-earth-orbit technique as a means of achieving an early manned lunar landing. By overcoming the limitations of current booster capabilities, and the limitations of boosters available in the near future, the rendezvous technique may make a manned lunar landing possible before one can be achieved through the direct ascent approach. Project GEMINI will use advanced two-man MERCURY-type spacecraft, and is designed to produce the necessary experience in rendezvous techniques through the practice of rendezvous and docking maneuvers with a modified ARENA–B booster stage.

Meanwhile, NASA will continue to press the development of the direct ascent method of reaching the moon, based on the NOVA launch vehicles, as well as the rendezvous method, based on the ADVANCED SATURN, in order to achieve the earliest possible manned lunar landing. For either method, a common APOLLO spacecraft is being developed. Both Project MERCURY and Project GEMINI will produce data which will be incorporated into the design and operation of the APOLLO spacecraft. Project APOLLO is progressing on a schedule fully compatible with developments in the necessary launch vehicles.

The APOLLO space craft will be modular. The crew will be housed in a command module, a service module will contain support and various propulsion

systems, and a lunar landing module will be added to land the command and service modules on the moon.

The effort devoted to APOLLO will be substantially increased in fiscal year 1963, as the development of the command and service modules builds up, and as the first test hardware is delivered. Tests of flight hardware will be initiated in fiscal year 1963 using solid rocket suborbital launch vehicles.

The manned spacecraft technology effort provides necessary support to Project GEMINI and Project APOLLO; exploring alternative lunar landing systems and conducting inhouse evaluation and testing of contractor developments. It also funds contracts for independent studies of state-of-the-art technology and alternative methods of achieving program objectives.

Aerospace medicine funds will provide NASA with the data and information necessary to insure that man performs to his maximum capability in space, through research and study of the problems arising in the space environment.

Funding requirements—Manned spacecraft technology

	1961	1962	1963
Mission analysis	$363,000	$857,000	$480,000
Systems development and analysis	1,657,000	10,520,000	6,120,000
Mission simulation and training		1,525,000	2,235,000
Operational methods and systems		2,050,000	2,929,000
Total	2,020,000	14,952,000	11,764,000

To insure successful and timely completion of the GEMINI two-manned spacecraft and the APOLLO lunar landing spacecraft, the Manned Spacecraft Center engages in intensive, inhouse test and evaluation of spacecraft and related area contractor developments. Alternate spacecraft systems must also be evaluated as potential backups or replacements for the primary systems. The Manned Spacecraft Center contracts under this project for services to obtain independent evaluations of state-of-the-art technology, for studies of alternate techniques for accomplishing technical objectives, and for procurement of existing hardware to be tested and evaluated by its technical personnel.

MISSION ANALYSIS

This area provides for the analysis of manned space flight missions to determine optimum trajectories, guidance and control requirements, abort considerations, and tracking and data acquisition requirements. From such studies, recommendations regarding configurations, guidance and control techniques to be utilized, as well as pilot display requirements and other operational techniques will result. The studies in this area will be theoretical in nature. Development of specific hardware resulting from these studies will be funded under Systems Development and Analysis.

SYSTEMS DEVELOPMENT AND ANALYSIS

This area provides for the evaluation of backup spacecraft systems hardware, spacecraft test instrumentation, and scientific equipment as required to support the manned spacecraft missions.

MISSION SIMULATION AND TRAINING

Studies of mission simulation requirements and the development of mission simulators and crew training equipment are funded in this area. All phases of orbital, circumlunar and lunar landing flight are considered in order to simulate on the ground many of the tasks and problems that the astronaut will face in space. Simulation of the rendezvous and docking process is particularly important to both Project GEMINI and Project APOLLO. Advanced technical studies and developments on these problems provide a base for the requirements of each of the flight projects.

OPERATIONAL METHODS AND SYSTEMS

Studies and evaluation of operational techniques and subsystems are funded in this area. All phases of a mission are investigated including the preparation for launch, earth-moon communications and control, earth landing an retrieval systems operation, ground handling and displays of flight data.

Aerospace medicine

	1961	1962	1963
Acceleration and weightlessness effects	$1,830,000	$6,130,000	$6,275,000
Radiation protection	1,190,000	3,800,000	5,410,000
Life support systems	1,226,000	4,656,000	4,780,000
Crew medical selection and monitoring		2,658,000	2,855,000
Total	4,246,000	17,244,000	19,320,000

The aerospace medical effort in the manned space flight programs has the objectives of insuring the safety, reliability, and effective performance of the flight and ground operations personnel during the preparation and conduct of manned flight missions. To accomplish these objectives on a time scale compatible with the development and flight schedules, development and testing effort is needed in the following areas: effects of weightlessness and acceleration; radiation protection for APOLLO; life support systems requirements; and medical selection and monitoring of crews. In addition to industrial contracts, a substantial portion of this work will be accomplished at Department of Defense facilities on an individual task basis.

ACCELERATION AND WEIGHTLESSNESS EFFECTS

The physiological effects of prolonged periods of zero gravity are not known. It is necessary to evaluate the possibly harmful effects of stress on human subjects due to changes in the gravitational-inertial force environment. Human and animal subjects will be exposed to ground-based approximations of selected portions of Project APOLLO and other space flight profiles in disorientation devices to study their psychophysiological responses to the varied force environments to be encountered during manned space flights.

Animal experimentation is required to validate findings and extrapolated assumptions obtained from the above study programs. Efforts in fiscal year 1963 will provide for the completion of development of animal experiments and the required equipment, which was started in fiscal year 1962.

Booster phase and reentry acceleration forces anticipated during manned space flight profiles will be duplicated in dynamic flight simulators to study human physiological reactions to such forces. Other stress factors such as noise and vibration which may adversely affect pilot performance and produce undesired psychomotor performance aberrations must be determined. Performance degradation and psychophysiological tolerance limits must be defined for each planned flight mission profile. The development of biosensors is required to evaluate the effects of space flight and for ground-based studies. In addition, the development of specific in-flight experiments will be accomplished.

RADIATION PROTECTION

Protection of the APOLLO flight crews from radiations in space which will be encountered during the circumlunar and manned lunar landing missions is the primary objective of work in this area. Effort in fiscal year 1963 includes the following essential parts: development and biomedical testing of Apollo shielding materials and techniques; development and testing of instrumentation to measure the radiation dose received by the crews; containing studies to define the biological effects of the energy spectra and flux levels which may be encountered during solar events; and correlation and analysis of physical data obtained on the space radiation environment to evaluate the hazards associated with the several mission profiles.

LIFE SUPPORT SYSTEMS

Development and testing in life support and environmental control requirements and methodology in fiscal year 1963 is necessary for the longer duration (7–14 day) flight mission profiles of Project GEMINI and Project APOLLO. This effort should determine adequate atmospheric composition and investigate methods of maintaining that atmosphere within permissible tolerances to avoid accumulation of toxic gases and particles, trace contaminants, and humidity in the cabin.

Development of restraint and positional systems and methods to maintain optimal musculo-skeletal tone will parallel development of nutrition and waste disposal equipment and techniques. Development of intravehicular and extravehicular full pressure suit and system requirements and techniques for escape, transfer, survival, and rescue will constitute a substantial segment of the effort in life support systems studies. Human subjects will be used to study systems performance and psychophysiological effects of environmental factors to be encountered in manned space flight.

CREW MEDICAL SELECTION AND MONITORING

The success of the manned flight missions will be related directly to the reliability of the crews involved. Because mission profiles extend beyond any heretofore experienced, considerable study will be devoted to the development of well-defined and meaningful psychological and physical examinations and testing of astronaut candidates. It is necessary for groups of subjects with varied physical features and mental postures to be subjected to searching physical examinations and laboratory analysis while under normal and stress conditions. These groups will experience complete batteries of phychological tests to determine the psychophysiological factors regarded as essential for astronauts. Studies in this area are required prior to the selection of additional astronauts for manned space flight. Development of biomedical monitoring equipment and techniques, and systems for the collection, storing, and processing of psychophysiological data will also be pursued in fiscal year 1963.

Mr. THOMAS. This is the advanced manned space flight program broken down into three programs; manned spacecraft technology, aerospace medicine, and flight program.

Your big one is the flight program which is $863,628,000 in 1963 as against $147,241,500 in 1962.

Tell us about this.

MANNED SPACECRAFT TECHNOLOGY

Mr. HOLMES. I think that if we take the first item, $11,764,000 and refer to its breakdown on page RDO–2–3, we see that this is in the area of technology and study. It applies primarily to the APOLLO program although some parts of it apply to this.

Mr. THOMAS. Who is your contractor here?

Mr. HOLMES. All of this work is done here in-house or by small studies in manned spacecraft technology. The mission analysis is primarily the manned space assistance analysis group and so is the systems development and analysis work.

Mr. THOMAS. Where is this done?

Mr. HOLMES. The manned space work is done at Houston.

This is done under Mr. Faget. All of this is done down there.

Mr. THOMAS. You do not even have any dirt flying down there and you cannot do anything down there for this.

Mr. HOLMES. We have 800 people; this is thinking rather than "dirt flying." This is all study.

AEROSPACE MEDICINE

Mr. THOMAS. What is your next item, your $19 million item?

Mr. HOLMES. The $19 million item is "Aerospace medicine" and this is primarily——

Mr. THOMAS. What is your breakdown?

Mr. HOLMES. The breakdown is shown on page RDO–2–4 under "Aerospace medicine." Here we find an item of $6,275,000 for acceleration of weightlessness. That work is being done by Dr. Graby, of Pensacola, and fits in two parts.

Mr. THOMAS. Doctor who?

Mr. HOLMES. Dr. Graby, at Pensacola. The Navy is doing that work for us.

Mr. THOMAS. The Navy?

Mr. HOLMES. Yes, sir. This is acceleration and weightlessness experiments and primarily that part of this is being done there.

The next is the Life Support Systems. This breaks down into two major parts.

Mr. THOMAS. Who is doing that work?

Mr. HOLMES. Most of that work is being done at Houston although the Department of Defense is doing some work in one part of it which is atmospheric investigations. We have atmospheric investigations and pressure suit development which is being done entirely out of Houston Aerospace Medicine Group with some support from Wright-Patterson. We use a contractor for the other part of that.

FLIGHT PROGRAM

Mr. THOMAS. What about your flight program in the amount of $832,544,000? Insert pages RDO 2–6 through 16 in the record.

(The material referred to follows:)

Flight program

	1961	1962	1963
Manned 1-day mission:			
Capsules, equipment, and services			$4,500,000
Flight operations			1,480,000
Recovery operations			6,200,000
Total			12,180,000
GEMINI:			
Spacecraft:			
Spacecraft development:			
Engineering		$7,900,000	22,500,000
Fabrication and procurement		26,100,000	86,000,000
Flight test support			2,150,000
Operational support		699,500	15,200,000
Supporting development			5,500,000
Launch vehicles:			
TITAN II		21,900,000	50,000,000
ATLAS-AGENA		4,200,000	21,850,000
Total		60,799,500	203,200,000
APOLLO:			
Spacecraft:			
Command and service module		35,800,000	345,000,000
Lunar landing module		3,250,000	123,100,000
Guidance and navigation system		4,900,000	32,400,000
Instrumentation and scientific equipment		1,600,000	11,500,000
Operational support		1,100,000	2,500,000
Supporting development		2,150,000	3,000,000
Launch vehicles:			
Solid, suborbital		5,446,000	8,800,000
SATURN, C-1			90,864,000
Total, Project APOLLO and launch vehicles		54,246,000	617,164,000
Total, flight programs		115,045,500	832,544,000

MANNED 1-DAY MISSIONS

The rapid progress on Progress MERCURY in the form of successful manned suborbital flights and unmanned orbital test flights and the immediate prospect of manned orbital flight in fiscal year 1962 has led to a change in the current planning for the total resources of the project. Effort has been initiated in fiscal year 1962 and will be continued in fiscal year 1963 to modify four MERCURY spacecraft to carry astronauts on 1-day missions of about 18 orbits around the earth. This modification effort will extend the time that a MERCURY spacecraft will support a man in orbit from the current 4½-hour mission to a 24-hour mission. Four manned 1-day missions are now planned for the latter part of 1962 and early 1963.

The objectives of the manned 1-day mission include the achievement of space flight for the longest period possible at the earliest date possible; the collection of data on man's reaction to zero gravity and to the space environment for extended periods of time; the collection of data on the functioning of spacecraft subsystems over extended periods of time; and the realization of the maximum potential of Project MERCURY. Information from these longer duration flights will be of value to both the two-man spacecraft development, Project GEMINI, and the three-man spacecraft development, Project APOLLO.

MERCURY-ATLAS launch vehicles similar to those used on Project MERCURY flights will be used for the manned 1-day missions as will the Project MERCURY ground support equipment. The MERCURY tracking network, augmented in fiscal year 1962 specifically for this purpose, will be used to support these 1-day flights.

GEMINI

A major advance in NASA planning for manned flight has occurred within the last 8 months. It has become apparent that the use of the rendezvous technique offers the possibility of achieving a manned lunar landing earlier than does the direct ascent method. By using the ADVANCED SATURN launch vehicle, expected to be completed prior to the NOVA launch vehicle, and rendezvous methods, it may be possible to send the APOLLO spacecraft to and from the moon before such a trip would be possible using the NOVA. The rendezvous and docking of spacecraft and boosters in space may be compared to aerial refueling in that it makes possible the resupply of a vehicle in space, thus extending its mission capabilities. The rendezvous maneuver makes it possible to put a much larger effective payload in space with a given type of booster. Since our planned manned space flights are limited by the booster capability available, the development of the rendezvous technique will enable us to get the most out of our earlier boosters. Also, as manned orbital flights become more frequent, there will be instances when personnel transfer and spacecraft repair needs will make the mastery of rendezvous technology essential.

In light of the attractiveness of the rendezvous concept it is necessary to determine how best to rendezvous and dock spacecraft and propulsion stages in space and whether this technique should be applied to the manned lunar landing. Project GEMINI, a rendezvous and docking technique development effort, has been initiated in fiscal year 1962. The two-man spacecraft to be used in GEMINI will be launched into earth orbit by TITAN II vehicles. The spacecraft will rendezvous and dock with a specially configured AGENA stage that has been launched on an ATLAS. The rendezvous capability that is developed here is also directly applicable to the accomplishment of a lunar landing with an APOLLO spacecraft.

Project GEMINI flight missions are now planned to begin in mid-1963, more than a year before manned flights in APOLLO. In addition to developing and testing rendezvous and docking techniques during orbital flight, these missions will train pilots in spacecraft control and maneuver. GEMINI missions will also expose astronauts to weightlessness and the space environment for periods of time approximately as long as those necessary for flight to the moon.

Spacecraft development

The spacecraft that will be used in the GEMINI development project is a successor to the MERCURY capsule. Development of this two-manned spacecraft has been initiated in fiscal year 1962. By the end of fiscal year 1962, engineering design will have been completed and production of the spacecraft initiated. Peak production of the spacecraft will be reached during fiscal year 1963. The first qualification flight of the spacecraft is now planned for the middle of 1963. Although the spacecraft will be based largely upon MERCURY technology, it will require new subsystems for reaction control, onboard power, inspace maneuvering, and control in order to meet the demands of increased spacecraft size and extended maneuverable flight.

Spacecraft and subsystem design and development will profit from experience with the MERCURY capsule. The spacecraft structure will be designed to allow easy access to component subsystems, an important consideration in spacecraft checkout and repair. Subsystem components will be designed and developed employing a modular concept so that they may also be used in later spacecraft, such as the APOLLO, and to permit easy replacement when necessary.

GEMINI plans provide for the development and production of 12 two-manned spacecraft of which 3 will be refurbished for reuse if necessary. Eleven Atlas-Agena booster stages will be modified to act as rendezvous target spacecraft. Three of these will be spares. Of the 12 flight missions planned, 8 will involve rendezvous-docking operations.

Operational support

Operational support services for the flight missions will be provided by organizations other than the primary spacecraft contractor. Flight operations, landing and recovery, at a relatively low level in fiscal year 1962 and part of fiscal year 1963, will make heavy demands during the flight program. Costs for additional contractor personnel deployed with the tracking net and at the control center and costs of necessary ship operations will appear in this category. Major emphasis in fiscal year 1962 and early fiscal year 1963 is on

flight simulation and mission analysis. A ground-based program of rendezvous technique development, simulation, and training has been initiated in fiscal year 1962 and will reach an optimum level during fiscal year 1963.

Supporting development

Funds in this category cover the development of project components and test items that are not generally included in the prime contractor's effort. Items that have been initiated in the manned spacecraft technology area are approaching the hardware fabrication stage are continued in this area. An example of this type of item is the paraglider that may be used in the spacecraft landing system.

Spacecraft landing and recovery will differ markedly from the techniques employed with MERCURY. Controlled land landings of the spacecraft rather than landings at sea are an objective of the project. The magnitude of the effort required to deploy adequate naval forces for the recovery of the spacecraft at sea is such that any means for avoiding, or at least minimizing, this effort is highly desirable. If space flights are to be accomplished on anything like a routine basis, spacecraft must be designed to alight on land at specified locations. Although the spacecraft will be designed to land at sea as well, a vigorous effort is under way to find a solution to the land landing problem. Of the concepts being evaluated and tested, an airplane type of landing using a paraglider shows the most promise. Landing and recovery techniques and experience will be of great value in solving similar problems with the heavier APOLLO spacecraft.

Launch vehicles

The TITAN II, as modified for GEMINI, will be used at the launch vehicle for the two-manned spacecraft. The TITAN II is necessary to boost this larger spacecraft into earth orbit with a minimum prelaunch period on the pad. The minor modification of the TITAN II for this project will not require extensive development of new components. Fiscal year 1963 funds requested are the second increment for the procurement of 15 vehicles, of which 3 are spares.

The ATLAS-AGENA launch vehicle will be used as the rendezvous target space vehicle. The specially configured AGENA stage will serve both as an upper stage on the ATLAS launch vehicle and as the rendezvous target. The AGENA stage will undertake any necessary gross orbit changes and maneuvers and the manned spacecraft will carry out the terminal docking maneuvers. Following launch on an ATLAS booster, an initial firing of the AGENA stage will be required to achieve earth orbit. The AGENA restart capability will then be used for the primary rendezvous maneuvers as directed by the astronauts in the spacecraft. Fiscal year 1963 funds shown are the second increment for procurement of 11 launch vehicles, of which 3 are spares.

APOLLO

The APOLLO project covers the development and fabrication of a versatile multimanned spacecraft to carry astronauts on a lunar landing and return mission at the earliest practicable date. The spacecraft, with its associated onboard propulsion stages, is being designed to perform its mission using either the rendezvous or the direct ascent approach.

Development of the APOLLO spacecraft will be conducted in three phases.

In the first phase, a manned APOLLO spacecraft will be placed in a 300-nautical-mile orbit around the earth for periods as long as 2 weeks. This mission will provide an opportunity to test and evaluate the spacecraft systems and components and to conduct rendezvous maneuvers.

In the second phase, circumlunar flight and flight in orbit around the moon will permit close examination of lunar terrain and assessment of spacecraft systems for the final lunar landing mission.

The third phase of the project will be the manned lunar landing with the APOLLO spacecraft and return to the earth.

Formidable obstacles must be overcome in the design and development of a spacecraft that will protect three astronauts from the hazards of the space environment. The APOLLO will be the first manned spacecraft to leave near orbits around earth and enter outer space. The problems of exposure to radiation, puncture of the spacecraft by micrometeorites, and the effects of prolonged weightlessness, in addition to the more basic problems of mechanical reliability, all combine to challenge the ingenuity of scientists and technicians.

Based on experience with the MERCURY capsule and inhouse and contractor studies of the requirements for a lunar landing spacecraft, NASA selected a prime contractor for the APOLLO spacecraft in fiscal year 1962. Contractor briefings were held on the requirements and general specifications for the spacecraft, contractor proposals were subsequently evaluated and North American Aviation Corp. was selected as prime contractor. The prime contractor will develop and fabricate the spacecraft and coordinate associate contractor efforts.

Command, service, and lunar landing modules

The APOLLO spacecraft will be constructed of separate modules, each designed to fulfill specific mission requirements. A command module will serve as a control center for spacecraft and launch operations, house the crew during missions, and serve as the entry and landing vehicle for all missions. A service module will house support systems and components, and will incorporate the propulsion systems required for emergency abort, retropropulsion for return from earth orbit, midcourse flight path correction, lunar orbit, and lunar takeoff. Lunar landing will be accomplished by the addition of a lunar landing module containing a propulsion system.

The modular method of construction offers flexibility in assembling spacecraft configurations; each spacecraft will be composed of the modules necessary to fulfill mission objectives. The same command module configuration will be used for all missions. The lunar landing module will be used only on lunar landing missions.

The prime contractor will develop the command and service modules. An associate contractor will be selected to build the lunar landing module.

Major effort in fiscal year 1962 has been devoted to the study of the many problems to be faced in spacecraft development. Feasibility tests at the laboratory level are also being conducted on potential solutions to design problems. In both fiscal year 1962 and fiscal year 1963 the contractor will design spacecraft modules and components and carry out test programs on early configurations of the design items. Boilerplate models of the command module will be flown as payloads on developmental SATURN flights in 1963 to test various reentry configurations. By the end of fiscal year 1963 initiation of the spacecraft fabrication for the first phase of the project is planned. Examples of design, development, and test effort on problems connected with the command, service, and lunar landing modules that will be conducted in fiscal year 1963 are noted below.

Off-the-pad and postlaunch abort systems must be provided for the command module. The most difficult abort task would occur while the module is in the atmosphere, and it is necessary to separate and clear the module from the launch vehicle. Since the launch vehicle would have relatively less drag than the spacecraft, merely separating from the launch vehicle would not be sufficient. The spacecraft must be able either to outrun the launch vehicle or to get off to one side and let the launch vehicle go by. An escape tower incorporating high thrust rockets, similar in principle to that used for the MERCURY, may be used. Once outside the atmosphere, high thrust is no longer required and the escape tower can be jettisoned. The propulsion system on board the spacecraft will then be used to provide the velocity increments required for return to earth from an aborted mission.

Selection of the command module detailed configuration is a major focus of attention in fiscal year 1962 and will continue to be so during fiscal year 1963. Configuration of the APOLLO command module will be markedly different from both the MERCURY and GEMINI spacecraft. Spacecraft reentering the earth's atmosphere will initially be traveling at speeds in excess of 35,000 feet per second. As a result, the spacecraft will have to withstand reentry heating conditions considerably higher than those previously encountered by manned spacecraft. By jettisoning the service module prior to reentry only the command module will need thermal protection, but the provision of effective protection, particularly from radiative heating, involves extensive design and test of proposed solutions.

In order to minimize guidance problems on return to earth from the moon and problems in landing and recovery, it is essential to give the module maneuverability so that the reentry corridor is wider and the recovery areas can be predetermined. Through the use of module configurations with a lift-to-drag ratio of 1:2 or higher it is possible to achieve maneuverability without incurring the weight penalty of an additional propulsion system.

The onboard propulsion system that is to be included in the service module will provide propulsion for all space maneuvers and will utilize a highly reliable propellant. Instant start and restart during flight and maximum impulse with minimum weight and space are objectives of this system development. A propulsion system using storable hypergolic propellants will be designed and developed by a North American subcontractor in fiscal year 1962; other backup designs and developments will be pursued to insure that the best onboard propulsion system is available on a timely basis.

The designing of an APOLLO command module shell that is resistant to meteoroid damage is another area of concern. Scientific satellites that will be flown by NASA should help answer the question of how much hazardous debris is found in space. However, data from studies on material penetration and cratering at meteoric speeds are needed to design and test structures for the APOLLO spacecraft.

Guidance and navigation system

The basic guidance and navigation system for the APOLLO spacecraft is being developed by the Massachusetts Institute of Technology Instrumentation Laboratory, an associate contractor on the project. The contract for the system was let in fiscal year 1962 and will continue during fiscal year 1963. The MIT Instrumentation Laboratory will develop the system; however, operational systems will be procured from industrial sources. Fiscal year 1963 funding for these sources is included.

The system will be an integral part of the command module and will function in all phases of the lunar landing and return mission. A design requirement for APOLLO is that the spacecraft be commanded by the crew. Although information from the earth-based tracking and computation may be available, the crew must be able to perform their flight mission without external aid. Navigation measurements, trajectory determinations, and calculation of required corrections will be based on information from a variety of instruments, such as automatic center and edge trackers, optical instruments of the sextant-type and radar altimeters that will be designed and developed for APOLLO. Inertial guidance systems will be used during velocity corrections and reentry and as a backup to other parts of the system. During the midcourse phase of the flight, the crew may cross-check the system navigation results with data from the earth, but they will have a capability to navigate without such data input.

Instrumentation and scientific equipment

Fiscal year 1962 and fiscal year 1963 funds cover analysis of mission requirements for scientific equipment systems and test instrumentation; the funds will initiate the design and fabrication of prototypes of the scientific equipment systems necessary for the different phases of the lunar landing and return mission. These systems will be used to conduct basic scientific tests while the spacecraft is in orbit around the earth or the moon and eventually on the surface of the moon. Test instrumentation to evaluate the spacecraft and its components in flight will also be designed, developed, and fabricated with these funds. A number of individual contracts will be used to procure the required systems and instrumentation.

Operational support

Low initial levels of operational support are required for APOLLO in fiscal year 1962 and fiscal year 1963. Contractual services are required for preparation and conduct of suborbital solid rocket and SATURN firings used to test APOLLO prototype spacecraft module structures and systems. Preparation of the test items for launch, data acquisition, recovery operations and mission analysis must be performed for each of these developmental flight tests. Effort in the operational support category will reach significant levels when first phase flights of the APOLLO spacecraft are initiated.

Supporting development

A number of supporting development tasks for the APOLLO spacecraft are included in this category. The Manned Spacecraft Center will develop and test systems and subsystems not included in the prime contract; Center personnel will also evaluate promising developments in the manned spacecraft technology area and initiate hardware fabrication of items applicable to APOLLO. The Center will test recovery devices, beacons, flotation, and impact attenuation schemes for the command module. Funds are also included for wind tunnel tests, sled tests, and drop tests of parachute recovery systems, to be performed by other Government agencies.

Launch vehicles

A solid rocket launch vehicle will be developed and procured for the flight test of prototype APOLLO spacecraft modules. The modules will undergo short-range flights for the purpose of evaluating full-scale configuration concepts, systems hardware performance, spacecraft structural integrity, and the APOLLO spacecraft launch escape system under simulated SATURN flight conditions. The flight tests will occur during calendar year 1963, calendar year 1964, and calendar year 1965. Development and procurement of 14 solid vehicles was initiated in fiscal year 1962 and will be completed in fiscal year 1963.

SATURN C–1 launch vehicles of an operational configuration will boost into earth orbit the developmental APOLLO spacecraft flown in the first phase of the project. The fiscal year 1963 submission includes incremental funding for 10 of these operational SATURN C–1's. Flights of these vehicles are currently planned to begin in calendar year 1964.

MANNED 1-DAY MISSIONS

Mr. HOLMES. This $832,544,000 breaks down into three major parts. Manned 1-day missions is the first part. We presently have scheduled to start early next year four of these missions, but whether or not we can carry out later plans will depend on how successful we are in the first ones. It is our philosophy that with the cost to the Government, the strain on the organization, and the threat of hazard, we should fly these missions only to give us more information. It has been true, and is true today, that on each flight we get a great deal more information.

This $12,180,000 will provide for the flight of four 1-day missions and the following part on that——

Mr. THOMAS. You have the Navy there for $6.2 million.

Mr. HOLMES. Yes, sir. That is also salaries and expenses.

GEMINI

Mr. THOMAS. What about the spacecraft?

Mr. HOLMES. Let me describe GEMINI which follows in this program of ours. We presently have three orbit MERCURY's. We hope to extend it to 1 day and prior to completion fly the first two-manned spacecraft capable of extended missions and, as it starts to fly, the first APOLLO spacecraft sequentially step by step.

Mr. THOMAS. You are starting out with two, and then three?

Mr. HOLMES. Yes, sir; one, two, and then three astronauts in the craft. As you see, the first three items in the GEMINI program total $110 million, approximately.

Mr. THOMAS. Who is your contractor for that?

Mr. HOLMES. That is McDonnell in St. Louis.

RENDEZVOUS OF SPACECRAFT

Mr. THOMAS. What is the theory behind this GEMINI project?

Mr. HOLMES. The theory is in two parts: one is in order to prolong our experience on weightlessness about the same period of time we might experience in going to the moon and back, up to a week. The second, another major aspect to confirm experimentally the kind of work we are doing in the simulation of studies of the feasibility of rendezvousing in earth orbit, bringing two objects together. These are two primary reasons.

Mr. THOMAS. You are not going to transfer anybody from one capsule to another, are you?

Mr. HOLMES. No, sir; not in the GEMINI program.

Mr. THOMAS. What are you going to do, hook them to each other?

Mr. HOLMES. Yes. We hope to put up a GEMINI craft after we have first put up an AGENA rocket. In this case the AGENA instead of being a second stage, will be the payload. We will have it fully fueled and send it into orbit and afterward launch at the proper time a two-manned spacecraft, hoping to get them in close proximity. Then we will bring them together by commanding this AGENA to turn its engine on to manuever to the GEMINI. It has a velocity incremental capability of something like 12,000 feet per second, and if we can get these two fairly close together at the start our incremental adjustments will be minor.

Then we have the final docking by the astronauts. That is, two astronauts in a capsule in earth orbit but not able to fly will, after the rendezvous, have an engine and fuel so they can change their orbits and maneuver. This, we feel, is a major step toward becoming proficient in atmosphere and space before we can conceive of going to the moon or another planet.

SYSTEMS ENGINEERING CONCEPT

Mr. THOMAS. Suppose it works? Are you going to need the big NOVA then?

Mr. HOLMES. Yes. Perhaps I could have just a minute to explain our system concept. Our system effort will be directed by our program office here in Washington and will work primarily with Von Braun's operation at Marshall and the Manned Spacecraft Center, and also with people at other centers such as Dr. Debus at Cape Canaveral. We must work together not only to award contracts but to concentrate on the systems engineering problem. To that end, we have brought into my operation Dr. Joseph Shea, a very competent engineer, to head the systems effort. Dr. Shea's work will be supported by people from Dr. von Braun's operation and Dr. Gilruth's operation. We are supporting it further with a contract you have heard about, this one going to the A.T. & T. and asking them to set up a systems analysis company in Washington.

Unless we study in detail how we get to the moon—people all over the country tell you how to get there—and, quantitatively, there are thousands of man-years of technical effort and billions of dollars involved to do this in the next decade, we must do this systems engineering now. Once we have done it, and I hope we can arrive at a really primary mode in the next few months, we can then try to concentrate on that, but we still must follow up with other steps. There is no doubt we will need the NOVA to go into interplanetary space. I hope the NOVA can be a very much sophisticated vehicle, even more than the ADVANCED SATURN. It depends on how close in time we must have it.

Mr. THOMAS. What do you mean by "sophisticated"?

Mr. HOLMES. By "sophisticated" I mean vehicles which may weigh as much as 35 million pounds and have as much as 40 million pounds of thrust.

We prefer, and Dr. von Braun prefers, a high-energy fuel like hydrogen for the upper stages, and we must have a 20-million-pound thrust for the first stage instead of 12 million. If we could speed it in time, which we cannot be sure of until we have the systems engineering job done——

Mr. EVINS. It is always good commonsense not to put all of your eggs in one basket?

Mr. HOLMES. Yes, sir.

Mr. YATES. That is the equivalent of what he said?

Mr. THOMAS. Dr. von Braun, is there any end to this program?

Dr. Holmes just mentioned this 7.5-million-pound thrust, and now we hear 20 million. Did I understand him to say 35 million pounds of thrust?

Mr. HOLMES. I said 35–40 million pounds of thrust.

Dr. VON BRAUN. I think landings on the moon are, in a way, a beginning, and until we have a good sound followon program——

Mr. THOMAS. Where are we going after we get to the moon?

Dr. VON BRAUN. First, there are still the planets. Second, we have to provide a lunar transportation system and follow on with more hardware for landing a few men on the moon.

AFTERNOON SESSION

Mr. THOMAS. Mr. Holmes, continue with the flight program and the GEMINI project. What is this money for?

Mr. HOLMES. First, continue on the GEMINI portion, Mr. Chairman, which is $203,200,000 of that total of $832,544,000. I believe I had finished discussing the spacecraft. I did not discuss the launch vehicles which are shown at the top of page RDO 2–7.

LAUNCH VEHICLES

Mr. THOMAS. How much is this for launch vehicles, the five items?

Mr. HOLMES. Sir, the two at the top of the page are part of GEMINI, and I had not quite finished giving you that information for the record. The launch vehicles for GEMINI are $50 and $21.8 million. There is a total in fiscal 1963 of $203,200,000; and of that, $50 million is for TITAN II vehicles which will launch the GEMINI spacecraft, and $21,850,000 is to order the ATLAS-AGENA's which will be used for the rendezvous part of the program.

Mr. THOMAS. Are these one man, two men, or three men?

Mr. HOLMES. Two men in the GEMINI spacecraft.

Mr. THOMAS. Who is the contractor?

CONTRACT WITH MARTIN CO. FOR TITAN II

Mr. HOLMES. The contract for the TITAN II in both of these cases is through the Air Force to procure the vehicles as a subcontractor for NASA. The industrial contract for the TITAN II is with the Martin Marietta Aircraft Co.

Mr. THOMAS. Where are they located?

Mr. HOLMES. They are doing most of the work in Baltimore, although the parts they are fabricating at Denver for the weapons system TITAN II, they are continuing to fabricate there. Assembly will be at Baltimore.

Mr. THOMAS. The Air Force is your contractor.

Mr. HOLMES. Yes, for both the TITAN II and the ATLAS-AGENA.

Mr. THOMAS. What kind of contract did you give these people?

Mr. HOLMES. CPFF contract in both cases.

Dr. SEAMANS. The industrial contract is cost plus, not the Air Force.

Mr. HOLMES. Yes, of course.

Mr. THOMAS. Roughly what are the terms of your contract? These Martin people are good. They have been in the business a long time. They have a plant in Denver and one in Baltimore, is that correct?

Mr. HOLMES. Yes.

Mr. THOMAS. Is the work done in Denver or in Baltimore?

Mr. HOLMES. Parts are done in each plant. The final assembly and overall test is done in Baltimore. The headquarters for developing these TITAN's for our GEMINI is in Baltimore.

Mr. THOMAS. What overhead are you allowing the company on these contracts for TITAN and ATLAS-AGENA?

Mr. HOLMES. I do not have that figure.

Mr. THOMAS. How many capsules for each? Four for TITAN?

Mr. HOLMES. There are 15 TITAN II vehicles.

Mr. THOMAS. What about the ATLAS-AGENA?

Mr. HOLMES. Eleven.

Mr. THOMAS. Twenty-six.

NATURE OF CONTRACTS

What is the nature of the contracts? What do you allow for overhead? What do you allow them to make?

Mr. HOLMES. Neither one of these contracts so far has been definitized. I think our average net fee from which they derive their profits, of course, has been something around 6.4 percent. I would expect it would run in this area. Their initial proposal shows a cost from Martin, for instance, of around $100 million, the ultimate total cost for these TITAN II's.

Mr. THOMAS. Is it a fee contract?

Mr. HOLMES. Yes, cost-plus-fixed-fee in both cases.

Mr. WYATT. We operate on a task order to the Air Force. The contract is actually with the Air Force, not with us. We reimburse the Air Force on the basis of charges they present to us. I do not know that we have the full details of the Air Force contract with Martin.

Mr. HOLMES. Neither of these contracts has been definitized yet. They are both letter contracts.

Mr. THOMAS. You are not going to spend $203 million without knowing what you spend it for, are you?

Mr. WYATT. Our procedure is that the Air Force acts as our agent, and we reimburse them on a task order basis.

ADMINISTRATION OF CONTRACTS

Mr. THOMAS. Who is your negotiating team for the Air Force—the generals?

Mr. WYATT. The Space Systems Division.

Mr. THOMAS. Who is it headed by?

Dr. SEAMANS. General Ritland is the commander of the Space Systems Division.

Mr. THOMAS. Over him is General Schriever?

Dr. SEAMANS. Yes.

Mr. THOMAS. How much business experience has our distinguished lieutenant general had? Do you turn over $203 million to him?

Dr. SEAMANS. Not the full amount, because we have a direct contract with McDonnell for the spacecraft. The part we are talking about here runs up to $71.8 million.

Mr. THOMAS. I do not mind telling you, I think the generals and admirals ought to stick to the jobs they are trained for, military matters, and not business matters. You expect them to be businessmen. We expect you folks to tend to this business, spending this money, not the generals and admirals.

Here is our distinguished friend who says he does not even know what is in the contract.

Dr. SEAMANS. He said the contract has not been definitized yet. I can assure you we are not just washing our hands of this program. The people in Houston, Tex., have the responsibility for the whole GEMINI program. The project office is set up for the technical direction as well as the administration of the contract, and the Air Force people report to that office.

Mr. THOMAS. None of your field officers will handle any business more than $4 million or $5 million. I believe you said a couple of them go to $5 million, and anything above that is approved in Washington. You are getting into real money now. It will have to be done here.

Dr. SEAMANS. The field offices will administer contracts considerably larger than $5 million. They will not approve them in the first place.

Mr. THOMAS. The administering is one thing, but signing the document which brings the cash is something else, and that will be signed here.

Dr. VON BRAUN. Could I add something to this. I have had quite a little bit of experience with the Air Force operation of the Space Systems Division on the west coast in the AGENA area, because we are buying these AGENA's through the Air Force. The ATLAS-AGENA program involves also ATLAS-AGENA's for the Air Force's MIDAS and SAMOS project, and our need for AGENA's for projects such as RANGER and now for the GEMINI rendezvous vehicle. I must say from what I have seen of the contract administration of the Air Force in the Space Systems Division in Los Angeles in the AGENA area, it is really beyond reproach. It is very well handled and competently handled. They have very fine officers doing this.

Mr. THOMAS. They are great businessmen.

Mr. HOLMES. I just reviewed the cost for the TITAN II. I have not done so for the ATLAS-AGENA. In our office, on what has been initially proposed by the Air Force before any definitization of contract, we will expect to know in detail what the production running costs are of the TITAN II as a weapons system, and what the scope changes are that we are paying for in order to make it a man-rated vehicle for GEMINI. I feel you are correct, we should not wash our hands of it.

OVERHEAD ALLOWED CONTRACTORS

Mr. THOMAS. What overhead is the Air Force allowing?

Mr. HOLMES. I cannot speak to this contract. I can speak from my own industrial experience that the overhead rate we were allowed was anywhere between 70 and 98 percent. On the engineering load basis, our overhead was around 97 percent, and I have seen as high as 106.

In this specific contract and what they are negotiating, they really have not come to that determination yet.

Mr. THOMAS. On top of that, you let them make 6½ percent net.

Mr. HOLMES. Yes, sir.

REASON FOR NEGOTIATION OF CONTRACTS BY THE AIR FORCE

Mr. EVINS. Is it because the Air Force has been using certain of these motors or vehicles that you are calling upon them to contract for NASA? You have 12 or 14 contracting offices and you explained earlier your system of contracting. Now, in this particular area you are turning it over to the Air Force. Why the disparity?

Dr. VON BRAUN. Because otherwise two different agencies of the Government would go to the same contractor buying virtually the same vehicle.

Mr. EVINS. It might provide a little competition.

Dr. VON BRAUN. But people would get conflicting directives. It also raises a question as to what kind of quality assurance program is being set up in those plants. We feel it is simply better for the Government if the contractor is confronted with only one contract administrator for one launch vehicle project.

Mr. THOMAS. More than likely you have a point there.

What part of the salaries of the officers and directors of this corporation is being charged to this contract? I know several of the people of this company, and they are distinguished citizens. About 99.9 percent of their work is Government work, is it not?

Mr. HOLMES. That is my understanding, yes.

In this case, I do not know the answer to your question, except that, as you well know, it is part of their general administrative expenses from which they must supply the funds for their officers, and that is subject to Government audit.

Mr. THOMAS. It is all subject to Government audit, and what they probably charge themselves is something else. How many $75,000 and $100,000 salaries do they allow? There is nothing the General Accounting Office can do about that except to see if the figures add up right. The substance of the contract, you gentlemen make.

CONTRACT FOR APOLLO SPACECRAFT

Let us go into the APOLLO spacecraft. Who is the contractor here?

Mr. HOLMES. The command and service model of the contract is North American. As you see, for that item in fiscal 1963 we are requesting $345 million.

Mr. THOMAS. Is this for one capsule?

Mr. HOLMES. No. That is 15.

Mr. THOMAS. Is this 10 or 15?

Mr. HOLMES. That is the first payment on 15. When I say first payment, I mean this fiscal year's expenses for 15.

Mr. THOMAS. Was it 15 or 10? I thought I saw 10.

Mr. HOLMES. I think I have it here. I may have misspoken.

Mr. THOMAS. What is the exact number, Doctor?

Mr. HOLMES. Sixteen boilerplate spacecraft, 16 mockups of various kinds, and 11 actual APOLLO hardware spacecraft.

Mr. THOMAS. This is research and development, and finally 11, 15, or 16 finished products; is that it?

Mr. HOLMES. It appears to be 11.

Mr. THOMAS. What will be the total cost?

Mr. HOLMES. I think the total cost probably will be somewhere between $750 million and $1 billion before we are done with the total scope of that North American contract. That includes not only the command and service models, but——

Mr. THOMAS. Is this North American?

Mr. HOLMES. That is North American. That includes also certain integration responsibilities which are in their contract.

Mr. THOMAS. Where are they located?

Mr. HOLMES. This is Downey, Calif.

Mr. THOMAS. Is the work done in California, or where?

Mr. HOLMES. The work, yes. The actual manufacture of these will be centralized in California, but subcontracted components will come from many States. Much of the development and spacecraft technology work which we referred to earlier will be done at our Manned Spacecraft Center.

Mr. THOMAS. No part of this money will be spent out of Goddard, will it?

Mr. HOLMES. No; no significant part that I know of, of this $345 million.

Mr. THOMAS. What kind of contract do we have with them, Dr. Seamans?

Dr. SEAMANS. It will be a cost-plus-fixed-fee contract.

Mr. THOMAS. Has it been formalized yet?

Dr. SEAMANS. It has not been definitized. It is in the process right now of being definitized. We have a target date of the 1st of June for the completion of that negotiation. We are working currently under a letter contract.

Mr. HOLMES. This is a letter contract with an authority limitation of $33,500,000.

Mr. THOMAS. What profit are you letting them make?

Mr. HOLMES. We will negotiate this with the definitized contract.

Mr. THOMAS. You had better not talk about it.

(Off the record.)

SATURN C–1 Development Program

Mr. Thomas. Let us go into the SATURN C–1. Put RDO 3–1 and 3–2 in there.

(The pages referred to follow:)

SATURN C–1

Summary of requirements

	1961	1962	1963
Vehicle development	$116,156,000	$182,106,000	$155,533,000
Engine development	33,823,000	39,993,000	36,743,000
System support	23,929,000	60,094,000	56,961,000
Total	173,908,000	282,193,000	249,237,000

OBJECTIVES

The purpose of the SATURN C–1 development program is to develop a high-thrust vehicle for general purpose application in manned or unmanned earth orbit missions, and to provide a test bed for the development of advanced systems and components associated with orbital rendezvous operations and the manned lunar landing objectives.

JUSTIFICATION

The C–1 configuration of SATURN is planned as a two-stage vehicle using clustered engines in each stage, and will be used primarily for placing approximately 10 tons of payload into low earth orbit. The first stage (S–I) is under development at the Marshall Space Flight Center, and uses the H–1 (188,000-pound thrust) engine produced by the Rocketdyne Division of North American Aviation, Inc. Production of the S–I stage will be performed by the Chrysler Missile Division at the NASA Michoud Plant in Louisiana. The second stage (S–IV) is being developed by the Douglas Aircraft Co., and uses the A–3 liquid hydrogen engine produced by the Pratt & Whitney Division of United Aircraft Corp.

Rocket engines used for the SATURN C–1 vehicle are developed under separate contracts and supplied to the respective stage contractors as Government-furnished equipment. The H–1 engine that is used on the S–I stage is nearing completion of the development necessary for manned rating. The simplifications that have been incorporated have been successful and should provide a high degree of reliability. The A–3 engine is basically the same as that used on the CENTAUR launch vehicle. This engine will be capable of producing 15,000 pounds of thrust and will be the first flight engine to utilize the high-energy propellent combination of liquid oxygen and liquid hydrogen. Changes to the basic CENTAUR engine are kept to a minimum level consistent with the six-engine cluster used on the S–IV stage of the SATURN C–1.

The SATURN C–1 development program offers the earliest possibility of the realization of a multiton payload capability for the initial phase of the manned lunar landing program. In addition, the SATURN C–1 program will support the development of high vehicle system reliability, which is of great importance to the performance of manned missions. The program will also serve as a prototype effort for gaining essential experience in the development, fabrication, and flight of large multistage launch vehicles; in this sense, it will serve as a valid point of departure for the development of the larger and more complex ADVANCED SATURN and NOVA vehicles which will be needed for manned lunar landing and manned interplanetary space flight. Much of the knowledge required for the development of these larger vehicles can be a logical extension of experience gained in the SATURN C–1 program in such areas as system engineering, manufacturing, materials processing, test and checkout procedures, instrumentation and facilities, ground support equipment, transportation of stages, and, even possibly, booster recovery.

The currently planned flight test program is divided into two major phases, block I and block II. In block I (flight vehicles SA–1 through SA–4), the test plan is to launch the phase I S–I stage with dummy upper stages to explore control and environmental conditions, tracking and instrumentation problems, and the operational requirements of large vehicles. The first block I vehicle was launched in October 1961 with virtually complete success; analysis of the flight data is now underway to permit the incorporation of any necessary design changes into subsequent vehicles. The block II flights (flight vehicles SA–5 through SA–10) will consist of the phase II S–I stage (modified for two-stage use), the S–IV stage, and an instrument unit and payload. The development test missions of the block II vehicles include the S–I/S–IV staging, the S–IV stage operating capabilities, and the system guidance and control function through S–IV stage cutoff.

In broad terms, the major effort in fiscal year 1962 centered on the preparation and launch of the first two flight test vehicles (SA–1 and SA–2), analysis of test data from those two flights, manufacturing and test on three more flight vehicles (SA–3, SA–4, and SA–5), and initiation of manufacturing on flight vehicles SA–6 and SA–7. In fiscal year 1963, three vehicles (SA–3, SA–4, and SA–5) are planned for launch; flight data from the fiscal year 1962 and fiscal year 1963 flights will be analyzed; manufacturing and test of vehicles SA–6 and SA–7 will reach advanced status; and manufacturing of the final three flight test vehicles (SA–8, SA–9, and SA–10) will be initiated.

TOTAL COST OF SATURN C–1 PROGRAM

Mr. THOMAS. This is $249 million in 1963, against $282 million in 1962. Vehicle development, $155.5 million. Engine development, $36,743,000. System support, $56,961,000. What will be the ultimate cost of this project?

Mr. HOLMES. This is the one we mentioned this morning. It probably will be close to $750 million to a billion dollars if you include in the total construction cost.

Mr. THOMAS. I thought that was a figure which you used on the original SATURN, and I believe Dr. von Braun said half a billion dollars.

Dr. VON BRAUN. $750 million.

Mr. HOLMES. I thought you asked this morning for costs including construction, $750 million. This is the original SATURN research and development costs.

Mr. THOMAS. Yes. Does this include the wrap-up of construction costs and everything against that $750 million?

Mr. HOLMES. That $750 million was just R. & D. that you referred to.

Mr. THOMAS. Is this $249 million going to wrap it up?

Mr. HOLMES. Dr. von Braun tells me that the $750 million includes that.

Mr. THOMAS. Will this wrap it up?

Dr. VON BRAUN. The one item for fiscal year 1963 is for the conversion of the west side of the tower in Huntsville, in order to test these boosters. This is another C. of F. item on the order of $2 million. This about wraps it up, yes, sir. It should be noted that this amount covers the direct R. & D. and does not include salaries and other indirect expenses.

Mr. THOMAS. For vehicle development, engine development, and system support, $249 million. Will this wrap it up?

Dr. VON BRAUN. Yes. Everything beyond that will now be procurement of vehicles in support of the APOLLO or any other programs that utilize the C–1 vehicle. There is the program under discussion also for the Office of Space Sciences using C–1 3-stage vehicles.

Mr. THOMAS. What would be a fair price after you get through with this research and development and have a complete unit?

Dr. VON BRAUN. I think the two-stage version, $18 million, and the 3-stage version, $22 million.

Mr. THOMAS. What is the horsepower now? What is the thrust?

Dr. VON BRAUN. One and a half million pounds. This is about 32 million horespower.

Mr. THOMAS. That is the 1½ million?

Dr. VON BRAUN. Yes.

Mr. HOLMES. I believe we have still a bit more money in 1964 to finish this up.

Mr. THOMAS. How much more?

Mr. HOLMES. Another $75 million to $100 million.

Dr. VON BRAUN. Could I comment on this? We distinguish between SATURN C–1 and SATURN C–1 B. The SATURN C–1 has 20,000 pounds orbit capability, and the C–1 B about 30,000.

Mr. HOLMES. We are not talking about C–1 B.

Dr. SEAMANS. There will still be a few of the C–1 development flights in fiscal 1964.

Mr. HOLMES. Yes.

Mr. THOMAS. For which you will require additional funds?

Dr. SEAMANS. For that reason, we do need approximately $75 million.

Mr. THOMAS. Beyond this.

Dr. SEAMANS. Beyond 1963, in order to complete the first 10 development flights of the SATURN C–1.

ADVANCED SATURN PROGRAM

Mr. THOMAS. Let us go to the advanced one. This is the big one, with 7½ million pounds thrust. Put pages RDO 4–1 and 4–2 in the record.

(The pages referred to follow:)

ADVANCED SATURN

Summary of requirements

	1961	1962	1962 supplemental	1963
Vehicle development	$623,000	$26,712,000	$37,600,000	$273,042,000
Engine flight hardware		300,000	8,750,000	28,995,000
System support		750,000	3,650,000	33,135,000
Total	623,000	27,762,000	50,000,000	335,172,000

OBJECTIVES

The purpose of the ADVANCED SATURN program is to develop a vehicle system with sufficient payload capability to perform manned lunar-landing missions using a single earth-orbital rendezvous; and to provide a basic vehicle for manned circumlunar and lunar orbit missions, and for unmanned lunar and planetary exploration.

JUSTIFICATION

The ADVANCED SATURN vehicle is designed to be either a two- or a three-stage vehicle, depending upon the mission to be performed. The two-stage version will be capable of placing approximately 100 tons of payload in earth

orbit and will be the primary vehicle for orbital rendezvous missions in support of the manned lunar-landing objective. The three-stage version will be capable of achieving escape trajectories with payloads up to 40 tons and will be used primarily for manned lunar orbit, circumlunar flight, and unmanned planetary exploration.

It is currently planned that the first-stage booster will be powered by five F–1 engines, each of which will develop 1.5 million pounds of thrust for a total thrust of 7.5 million pounds. The engines will be arranged in a square pattern of four gimballed outside engines and one fixed engine located in the center of the square pattern. This basic configuration provides for maximum flexibility in that two of the outside engines can be eliminated without redesign, thus providing a more economical stage for missions which do not require the full 7.5 million pounds of thrust.

The current plans for the upper stages provide that the second stage will be powered by five J–2 engines, each of which will develop 200,000 pounds of thrust, for a total thrust of 1 million pounds. The third stage will use one J–2 engine for a total thrust of 200,000 pounds, and will house the all-inertial guidance system which sends commands to the control systems for each of the vehicle stages in the three-stage vehicle configuration. Both the second and third stages will use the high-energy propellant combination of liquid hydrogen and liquid oxygen.

The various stages of the ADVANCED SATURN vehicle will be developed through contracts with industry under the overall systems management of the Marshall Space Flight Center at Huntsville, Ala., which will include the maintenance of close and continuous coordination between stage contractors and contractors on associated spacecraft development. By the end of fiscal year 1962, all major contracts will have been placed.

Conceptual and preliminary design studies initiated in fiscal year 1961, and continued into fiscal year 1962, have provided the basis for determining the current configuration of the ADVANCED SATURN vehicle and the sequence of principle milestones to be accomplished. Major emphasis in fiscal year 1962 will be placed on the procurement of long leadtime items and the initiation of major systems contracts as necessary to meet these configuration and milestone requirements in support of the manned lunar-landing objective.

To meet the target schedules currently established, supplemental funds in the amount of $50 million will be required during fiscal year 1962. These funds, combined with the basic amount in fiscal year 1962 and the additional funds for fiscal year 1963, will provide the necessary buildup of development effort to achieve the first flight of the ADVANCED SATURN in the first half of calendar year 1965 and to meet followon schedule requirements for the APOLLO development program.

TOTAL COST AND COMPLETION DATE OF ADVANCED SATURN

Mr. THOMAS. You have vehicle development, $273 million; engine flight hardware, $28.9 million; system support, $33 million. You have here $335 million total for this year. You have a supplemental for 1962 of about $50 million. It was $27.7 million in the regular bill in 1962, and about two-thirds of a million in 1961. What will be the wrapup figure on this one?

Mr. HOLMES. About $1½ to $2 billion total.

Mr. THOMAS. When will it be ready? Did you say 1964 this morning, Doctor?

Dr. VON BRAUN. 1965.

CONTRACTORS FOR ADVANCED SATURN

Mr. THOMAS. Who is your contractor?

Dr. VON BRAUN. Boeing for the first stage, North American for the second.

Mr. THOMAS. Where is Boeing located?

Dr. VON BRAUN. The main plant is in Seattle, Wash. This program will be mainly at their new Michoud operation in our new Government-owned Michoud plant in New Orleans.

Mr. THOMAS. The other one is North American, did you say?

Dr. VON BRAUN. Yes, sir; North American, at the same Downey plant that handles the APOLLO.

Mr. THOMAS. How much will each get of this billion and a half dollars between Boeing and North American?

Mr. HOLMES. RDO 4–3 shows the breakdown for 1963. The first stage will be the most expensive certainly.

Mr. THOMAS. Who has the first stage?

Mr. HOLMES. Boeing. Something around $700 million will be required for the first stage. The second stage will be considerably less. Our estimates there are $500 to $600 million.

Mr. THOMAS. Have these contracts been formalized yet?

Dr. VON BRAUN. Preliminary contracts have been let for both, and the finalized contracts are under preparation today and are scheduled for this summer.

Mr. THOMAS. What is the sum and substance, in your thinking now? Do you want this off the record? Perhaps it should be. What do you think?

Mr. HOLMES. Your question is about what we think we will pay on these?

Mr. THOMAS. Do you want it on the record or off the record?

Mr. HOLMES. Let us have it off the record.

Mr. THOMAS. All right.

(Off the record.)

SELECTION OF CONTRACTORS

Mr. JONAS. How did you select these contractors—Boeing and North American? What kind of competition entered into it? How many other concerns were considered? How did you eliminate the others and on what basis did you make the selection?

Mr. HOLMES. Since the team was at Dr. von Braun's center, I think he should answer the question. There was very extensive study.

Dr. VON BRAUN. We had practically the entire major aircraft industry in the original competition on this first stage. This may not be a complete list, but I remember the following participants in the competition: General Dynamics, Lockheed, North American Aviation——

Mr. THOMAS. Where is Lockheed located?

Dr. VON BRAUN. Their headquarters office is at Burbank, Calif., and Sunnyvale has the missile division. In Burbank is the aircraft division. They have a division in Marietta, Ga., also.

Mr. JONAS. Was Douglas in the competition?

Dr. VON BRAUN. Douglas elected not to bid on this particular contract. They had just gained the S–IV stage contract from us, and they felt at that time they could not muster enough highly qualified people to go into this other one.

Mr. THOMAS. That is the Marietta contract?

Dr. VON BRAUN. No, I was talking about Douglas. Lockheed did compete, and lost.

Mr. JONAS. Lockheed is in Marietta?

Dr. VON BRAUN. Lockheed and Martin-Marietta, submitted a bid, yes.

NATURE OF BIDS ON ADVANCED SATURN

Mr. JONAS. What kind of bids did they submit? Definitive bids, complete bids, or just preliminary bids? To what extent was there competition?

Dr. VON BRAUN. We invited these companies to a bidder's conference. This bidder's conference took place in New Orleans. We gave them an opportunity to look at this empty Michoud plant and told them, "It is our intention for transportation reasons to manufacture this booster here in Michoud. You should look over the plant before you go to the bidder's conference." During the bidder's conference we told them, "Here is the scope of the work. We want you to build these boosters, and here are the descriptions, performance, line drawings, and so forth." We explained to them the procedure on preliminary design, design approval, final design, and even into the testing procedure as to how we feel a program of this magnitude ought to be handled. Then we told them: "We want you to build so many pieces of equipment. You should make a proposal in accordance with the procedures just outlined as to how many additional sets of hardware are necessary before the first piece of flight hardware can be built."

All of them, of course, have missile experience of some kind, and plenty of aircraft building experience, and on that basis they submitted these proposals. As I said, General Dynamics submitted one, Lockheed submitted one, Martin submitted one. Douglas in this case elected not to bid. There were two or three more. I think the Ford Motor Co. was in on this one, was it not, or was it another one?

Dr. SEAMANS. I do not think they made a proposal on the first stage of the ADVANCED SATURN.

Mr. JONAS. Were the bids dollar bids?

Dr. VON BRAUN. These proposals were in the form of extensive books of data. I would say the average proposal consisted of this much literature [indicating a foot high].

There was a technical proposal explaining the design and the technical procedures. Then there was a detailed writeup on company resources, for example, financial status, management organization, manpower, available facilities, and so on.

Mr. JONAS. Did they write a bid saying, "We will build this for so many million dollars"?

Dr. SEAMANS. No, because of the development nature of the job.

Mr. JONAS. It was a bid which was merely a statement outlining their qualifications. Is that right?

Dr. SEAMANS. That is correct. In addition, the proposal outlined the manner in which they would carry out the job, looking at the technical problems that needed to be solved, looking at the manufacturing quality and control. It was a very complete and detailed discussion of the manner in which they would conduct the job if they were selected.

Mr. HOLMES. And their estimate of the cost, of course.

Dr. VON BRAUN. A price was estimated, but the final actual price will depend upon the costs actually incurred including the changes which become necessary as the stage goes through its development. Since this is only one stage of a very complicated rocket system,

which no one has ever built before, we have to crank changes into this continuously. This is, of course, where you throw all the doors open again when it comes to pinning down the price in advance.

COST-PLUS-FIXED-FEE CONTRACTS

Mr. HOLMES. I would like to comment here. I feel very strongly about this. When a contractor bids a price on a CPFF contract, we use that as the base from which we negotiate any other changes. If we do not we might as well not have any bidding system. My feeling is that the proposer's original price is significant. This is the hard line we are taking with these contractors. Otherwise, we might as well not estimate anything on CPFF.

Dr. VON BRAUN. The fact that the fee is frozen—that is, the cost-plus-fixed-fee—of course, makes it attractive to the contractor to look good in the bidding. If we change the scope of work, which sometimes is unavoidable——

Mr. THOMAS. The nature of the beast is that you have a dozen changes. You must have.

Dr. VON BRAUN. Yes.

REVIEW OF PROPOSALS

Dr. SEAMANS. These proposals, Mr. Jonas, were reviewed in exactly the way we discussed this morning, with two evaluation teams, one for business and the other for technical content, and finally the results of this evaluation were brought to the Administrator, Dr. Dryden, and myself for final selection.

Dr. VON BRAUN. The technical committee makes its own findings, and there is a scoring board on which we agree beforehand.

Mr. JONAS. You went into it not only with respect to cost, but qualifications, ability, experience, et cetera?

Dr. VON BRAUN. Everything; yes. The form of procedure is the technical committee and the business committee both establish their scoring boards, where the weighing system is established as to what weight you attach to certain criteria of the proposal. For example, how important is experience? How important is geographic location? How important is the transportation of these large birds to the site? What test experience do they have with this kind of engine, and so forth? All these things are weighed. The technical board and the business board are strictly separated. They do not talk to one another. In fact, when they both report in to the Source Selection Board, neither board knows what the other has found.

Mr. EVINS. They all have the advice of the Department of Justice?

Dr. VON BRAUN. Yes. The Source Selection Board then meets on overall scoring out of the two findings, and makes its presentation to the Administrator and the Associate Administrator, who then finally decide.

LOCATION OF CONTRACTOR'S FACILITIES

Mr. JONAS. Where will the work performed by North American be done? In California?

Dr. VON BRAUN. For the second stage of the advanced SATURN, at the same plant in Downey, Calif., where the APOLLO capsule was built; yes, sir.

Dr. SEAMANS. The assembly of the stage will be at Seal Beach, a short distance away from the Downey plant so it can be easily shipped by water. It is a Navy facility and we are using the Bureau of Yards and Docks to assist in the construction activity.

NOVA DEVELOPMENT PROGRAM

Mr. THOMAS. Put pages RDO 5–1 through RDO 5–5 in the record here.

(The pages referred to follow:)

NOVA

Summary of requirements

	1961	1962	1963
Vehicle development	$297,000	$6,322,000	$131,916,000
Engine procurement			3,165,000
System support			28,493,000
Total	297,000	6,322,000	163,574,000

OBJECTIVES

The purpose of the NOVA development program is to develop a vehicle with sufficient payload carrying capability to achieve a manned lunar landing by direct ascent from the earth's surface; and to provide a basic high-performance vehicle required for future space missions.

JUSTIFICATION

The NOVA vehicle to be used for a manned lunar landing by direct ascent will consist of three stages and will be capable of accelerating to escape velocity the 150,000 pounds of payload required. Maximum standardization between the NOVA and SATURN vehicles will be effected to achieve economy of effort and to ensure a high degree of reliability in the final product. The first stage will be powered by eight 1,500,000-pound-thrust (F–1) engines, generating a total thrust of 12 million pounds, using RP–1 (kerosene) and liquid oxygen as the propellent combination. The vehicle will involve either a single large tank for each propellant or a cluster of tanks, depending upon which alternative provides the greater advantage in cost, production, transportation, and launching. A study on relative merits of the two approaches is now in process.

For the second stage, four 1,000,000-pound-thrust (M–1) engines, which use liquid hydrogen and liquid oxygen propellants, will be used to provide a total thrust of approximately 4 million pounds. In this development the normal problems of clustering engines are increased by the additional requirement to perform the mission even though one engine has failed. This capability, however, is particularly significant in that it provides an estimated 7-percent increase in stage reliability.

The third stage employs one 200,000-pound-thrust liquid hydrogen (J–2) engine and is basically the same third stage that is being developed for the Advanced SATURN. An all-inertial guidance system, also adapted from the basic SATURN equipment, will be mounted in this stage and will serve as a central command unit for the entire vehicle control system.

Whereas the effort during fiscal year 1962 is primarily concerned with engineering and the determination of detailed requirements, fiscal year 1963 will see an acceleration of hardware development, the procurement of long lead time items, and the start of more extensive analysis, simulation, and related effort associated with the integration of various elements in the vehicle system.

Funding requirements—Vehicle development

	1961	1962	1963
Development engineering:			
1st stage		$2,750,000	$65,956,000
2d stage			46,963,000
Guidance system		822,000	2,639,000
System integration	$297,000	2,750,000	5,804,000
Total	297,000	6,322,000	121,362,000
Flight and expendable hardware:			
1st stage			6,333,000
2d stage			3,166,000
System integration			1,055,000
Total, vehicle development	297,000	6,322,000	131,916,000

DEVELOPMENT ENGINEERING

First stage

Contractor design and development effort on the first stage will be started in late fiscal year 1962. This effort will be primarily concerned with engineering and the determination of detailed requirements. During fiscal year 1963, there will be an acceleration of hardware development encompassing detailed design of the stage itself and the related interfaces of test and launch facility requirements. Model tests of engine arrangements, both structural and aerodynamic, will also be conducted.

Second stage

In fiscal year 1963, contractor design and development effort will be initiated on the second stage. The contractor will work closely with the contractor developing the M–1 engine and will carry out engineering necessary for determination of requirements for the test facility design and construction. As in the case of the first stage, model tests will also be conducted.

Third stage

Funding for the third stage for NOVA will not be required until after fiscal year 1963.

Guidance system

During fiscal year 1963, the development effort started in the previous year will be continued with emphasis on reliability and flexibility in order that NOVA may achieve the planned types of missions, including, but not limited to, the manned lunar landing. In addition, close coordination will be maintained with the Massachusetts Institute of Technology, which is the guidance contractor for the APPOLO spacecraft.

System integration

This effort will be expanded substantially in fiscal year 1963 to resolve the interface problems arising between stages, to study system effects due to the interactions expected during flight, and to perform detailed integration of the initial NOVA payloads. Various studies will be conducted to determine the effect of replacing the liquid first stage with a solid motor first stage if solid motor development progresses favorably. Possible recovery techniques will also be examined.

FLIGHT AND EXPENDABLE HARDWARE

First stage

In the early stages of the NOVA development program, a leadtime of 30 months is required for some of the components to be assembled to form the first stage. Although components for the first flight article will not have to be ordered until fiscal year 1964, components required for the static test vehicle and to support the reliability and general development test program must be ordered during fiscal year 1963.

Second stage

The second stage will have a leadtime of 30 months; and, as in the case of the first stage, sufficient hardware must be ordered in fiscal year 1963 to support the static test and general development test program.

System integration

Components and subsystems will be purchased as required to solve experimentally the various propellant, aerodynamic, thermodynamic, and trajectory problems. Model-sized mockups of the launch vehicle, manufacturing and test facilities, launch facilities and supporting equipment will be made available to help solve problems associated with the total NOVA system development.

Engine procurement

	1961	1962	1963
1,500,000-pound-thrust (F–1) engine			$2,110,000
1,000,000-pound-thrust (M–1) engine			1,055,000
Total, engine procurement			3,165,000

ENGINE PROCUREMENT

The F–1, M–1, and J–2 are being developed under the liquid propulsion program. Accordingly, funding of these items under NOVA is limited to the procurement of engine hardware for the vehicle stages. During fiscal year 1963 funding in this area will provide for procurement of long lead-time items required for the vehicle static test article. No funding on the 200,000-pound-thrust J–2 engine is required in fiscal year 1963.

System support

	1961	1962	1963
Development engineering:			
Ground support equipment			$18,997,000
System instrumentation			2,110,000
Launch operations			1,055,000
Total			22,162,000
Flight and expendable hardware: Ground-support equipment			6,331,000
Total, system support			28,493,000

DEVELOPMENT ENGINEERING

Ground-support equipment

The development of ground-support equipment will be undertaken at the start of fiscal year 1963 and will be coordinated closely with design and construction of the launch and test facilities. Since it is planned that the NOVA will be assembled and checked out on the launch pad, the time on pad must be minimized in order to provide flexibility to meet launch schedule requirements. Accordingly, emphasis will be placed on development that will achieve high-speed subassembly checkout with maximum reliability.

System instrumentation

Intensive design and development studies are required during fiscal year 1963 to determine the type and degree of instrumentation required for a vehicle of this size. Instrumentation from the existing SATURN C–1 and that planned for the Advanced SATURN will be modified, where feasible, for adaptation to the NOVA program.

Launch operations

Studies will be undertaken during fiscal year 1963 on water transportation techniques for the NOVA stages, on the possible use of alternate methods of transporting stages, and on an improvements in launching techniques that will minimize vehicle time-on-stand.

FLIGHT AND EXPENDABLE HARDWARE

Ground-support equipment

During fiscal year 1963 initial orders will be placed for the procurement of special ground-support equipment required for the NOVA vehicle. The equipment will be used for fueling, launching, handling, and field checkout. Spare checkout equipment for standby or for replacement for items that may be destroyed during the launching operations will also be procured.

FUNDING AND COMPLETION DATE OF NOVA

Mr. THOMAS. Nova is for direct ascent to the moon and future space missions. When will this be ready? What is your timetable on this one?

Mr. HOLMES. If we go full out, the first flight in 1967.

Mr. THOMAS. 1967?

Dr. VON BRAUN. Yes, sir.

Mr. THOMAS. You have spent to date on this about $30 million?

Mr. HOLMES. Much less than that.

Mr. THOMAS. About $7 million or $6.5 million. You are getting started here with $163 million. What will be the wrap-up cost on this?

Dr. VON BRAUN. It is this propulsion thing that must not be overlooked.

The engine for the NOVA follows. The first stage uses the same engine as the advanced SATURN but there are more of them than we have in the advanced SATURN. This engine development is coming along to the tune of $56.7 million in 1962 and $55 million in 1963. This engine development contributes directly to NOVA but is charged under liquid propulsion.

Mr. HOLMES. That is true in all our stages.

Dr. VON BRAUN. The chairman asked the question how much money are we spending on NOVA and I think we ought to remember that the engine is a contribution already that——

Mr. THOMAS. It is separate and above from this?

Mr. HOLMES. This is true of the other vehicles we talked about, too. If we get into the F–1 and the M–1 engines which Dr. von Braun is talking about, they are now all funded separately from the NOVA vehicle item.

CONTRACTORS CONNECTED WITH NOVA

Mr. THOMAS. Who is your contractor here?

Mr. HOLMES. We have not let NOVA study contracts yet, Mr. Chairman.

Mr. THOMAS. Who is the engine contractor?

Mr. HOLMES. The Aerojet Co. has the M–1 engine.

Mr. THOMAS. Where is Aerojet located?

Dr. VON BRAUN. Sacramento.

Mr. THOMAS. Where is Rocketdyne located?

Dr. VON BRAUN. North of Los Angeles, Mr. Chairman.

Mr. THOMAS. What is the engine going to cost before you get through with it?

Mr. HOLMES. The M–1, $130 million.

Mr. THOMAS. Do you think that will do it?

Mr. HOLMES. Yes, sir.

TOTAL RAND D COSTS FOR NOVA

Mr. THOMAS. What is the engine going to cost and what is the bird going to cost?

Mr. HOLMES. We consider the NOVA a 3-stage vehicle and we consider we will be able to use the same third stage essentially that we are using on the advanced SATURN. I think $1.5 to $3 billion is a reasonable figure for the vehicle R. & D.

Mr. THOMAS. $1.5 billion?

Mr. HOLMES. $1.5 billion to $3 billion for the R. & D. only.

Does anybody disagree with me?

Dr. VON BRAUN. No, sir.

Dr. SEAMANS. This vehicle is larger than the advanced SATURN and for that reason the cost will tend to be greater. At the same time, Dr. von Braun indicated that we will draw on the experience in the advanced SATURN of the F–1 engine.

Mr. HOLMES. The third stage is a common stage for both vehicles.

STATUS OF ENGINE CONTRACTS

Mr. THOMAS. The only thing that you let the contract for is the M–1 engine and that is Aerojet.

Mr. HOLMES. It is significant that that was the last——

Mr. THOMAS. You have not let the contract on the configuration generally?

Mr. HOLMES. No, sir. We are just letting out a study contract out of Marshall very soon on the NOVA configuration. The reason we hasten to get the M–1 engine on a contract is that it is the limiting item since the other engines use the F–1 in the first stage and the J–2 in the third stage, and they are already under contract.

REQUIRED QUALIFICATIONS OF CONTRACTORS

Mr. THOMAS. What type of people do you get to do this study for you?

Dr. SEAMANS. They have to be people who have experience with boosters, with weapons systems, so they will be such firms as Boeing, General Dynamics, Lockheed, and Martin.

Mr. THOMAS. In other words, manufacturers again?

Mr. HOLMES. Yes, sir.

Dr. VON BRAUN. We have said that we will only accept proposals for the $700,000 study contract from contractors who have a follow-on capability. We have made it very clear to them however that this in no way, implies the study contractor will automatically get the vehicle development contract.

Mr. THOMAS. Can you not go outside the old military industrial complex and get some independent engineers? Maybe you can get some out of these high-grade technical universities and these big engineering firms. Let them make a study for you and give you some pretty good advice on this and who would be a pretty good contractor.

Dr. SEAMANS. We might want to do that except that at the Marshall Center we have people with this kind of experience. They are the final judges of what the specifications should be.

Mr. THOMAS. Why spend $700,000 in contracts for outside study in Dr. von Braun's setup?

Dr. VON BRAUN. Could I explain?

Mr. THOMAS. Say anything on earth you want to here and then you can change it in 5 minutes.

PURPOSE OF STUDIES

Dr. VON BRAUN. The purpose of these studies is twofold. On the one hand, we are trying to freeze a configuration for NOVA that offers us possibilities in many areas at the same time. For example, we would like to have a good 2-stage orbit capability to build a space station. We would like to have a good cargo-carrying capability to the moon. We would also like to have a capability built into NOVA for a more ambitious project in the future, such as the manned expedition to Mars. It is very much like the preliminary analysis of an airplane that has to meet a vast spectrum of marketing possibilities. It is a good idea to analyze this before you start defining the article. In addition to that, we know that NOVA will be so large and the shipping problem so formidable, only a contractor with warm water access can do it. We are telling them that warm water access and short communications to Canaveral are essential. So, we asked them also for a concept on how to manufacture and ship these things. NOVA is such a large vehicle that, in a way, it involves the philosophy of building a shipyard near the ocean.

Mr. THOMAS. Get some good independent engineers to work with your crowd for awhile. Try that and see what they come up with.

Dr. VON BRAUN. We have tried this and occasionally independent engineering companies have entered the picture. Our experience has been that the aircraft industry, which is really running out of jobs because there is hardly any military development going on there any more, is really the best talent source and experience source we can find.

Mr. THOMAS. The best talent?

Dr. VON BRAUN. Yes, sir.

ASSURANCE OF CONTRACTOR COMPETENCE

Mr. YATES. What steps has NASA taken to make sure it has tapped all sources of knowledge in the country on this?

Dr. VON BRAUN. We have been doing this for several years now and the interesting thing is that when it comes to studies and contracts of this magnitude, we actually come back to the same 10 outfits time and again that have proved they really have what it takes. All the others try hard but——

Mr. YATES. Do you think that, because of the condition you have of a follow-on capability in connection with this study, that is so? Why do you have to have a follow-on capability rather than permitting this to have widespread possible invitation?

Dr. SEAMANS. Because we feel that a company that has the follow-on experience will be the company that has the best talent for carrying out detailed design studies.

In answer to your earlier question——

Mr. YATES. Is that a very limited group?

Dr. SEAMANS. Yes, sir. For example, one very large manufacturing company tried to develop this kind of competence from scratch and there was very great interest in this large booster area on the part of their very top management. They made a very determined effort to be competitive on the first stage of a SATURN C–1, but their proposal revealed they were substantially behind the competence of the established aircraft companies for that particular, very complicated job.

Dr. VON BRAUN. The best yardstick is to ask a company how they would do a particular job. You ask them to write down their proposed technical and management plan; when you study that, you can very soon see whether they grasp the real significance of things.

SPECIAL STUDIES

Mr. YATES. The thought occurs to me that I have known of cases where manufacturers have had contracts and have gone to universities for special studies in order to carry these out.

Would that happen in these cases, too?

Dr. VON BRAUN. This is being done even by the aircraft manufacturers in special areas.

Mr. YATES. Not in connection with these?

Mr. HOLMES. No, sir. One of the things I believe we want to get in this study is the kind of practical knowledge that exists in these people who have handled these things, perhaps not quite of this size, but pretty nearly of this kind. You cannot go to the university for that because you merely get back to theory again.

Mr. THOMAS. Gentlemen, all this adds up to is this problem: There is a $1.5 billion involved and they have not let contracts other than downpayments and then they follow it up in 3 to 4 years.

UNPRACTICABILITY OF STANDARDS

Mr. EVINS. You have now sufficiently advanced that so we have a few firm ideas on standards and do not have to go all over the lot with too much variation? We recognize this is a new art, a new science, a new unexplored field, but it seems to me we have gone far enough to have certain standards adopted that we could work from and not be like the Reactor Division of the AEC and keep on expanding rather than concentrating on the successful ones.

Dr. VON BRAUN. Could I give you an illustration to answer this question of what you are running into in a case like NOVA?

Some people have proposed to assemble these large stages horizontally because they say we can do it with a normal-height building. Other people prefer vertical assembly which requires high areas, but you save money on housing equipment. These things are very difficult to appraise unless you really go into a preliminary design and price out the two alternatives.

Only then can you say which is better. When you assemble vertically some people have gone so far as to say, move a barge into the hangar and assemble the thing in a barge in a vertical position so you do not have to deal with the problem of moving it onto the barge.

These things must be analyzed in much detail and to find easily the $30 million difference between two such approaches. No amount

of general experience available, no matter how experienced the man, can detect which is the cheaper.

Mr. THOMAS. Would you do me a favor? Tell Dr. Rees when you see him tomorrow night, I do not want his job.

DIFFERENCE IN COST BETWEEN NOVA AND ADVANCED SATURN

Mr. RHODES. Dr. von Braun, this point interests me and I am sure there is a good answer to it. On the ADVANCED SATURN you will cluster five F–1 engines, and on the NOVA first stage it will be eight; is that correct?

Dr. VON BRAUN. Yes, sir.

Mr. RHODES. Did I understand you correctly when you said it is going to cost $1.5 billion to develop the NOVA and follow on from the SATURN C–5?

Dr. VON BRAUN. $1.5 billion to $3 billion for R. & D.

Mr. RHODES. Do you really get into that problem when you cluster eight engines as against clustering five?

Dr. VON BRAUN. NOVA is simply a much larger rocket. It is about twice as powerful as the SATURN C–5. Whereas you can utilize many subsystems, for example, the engines in the first stage and many other things like control actuators that do the gimbaling and things like that, you are still confronted with developing a larger rocket; consequently, larger facilities and larger test stands must be built. It is like developing a larger airplane when you have a small one.

The technology is the same, but the hardware is quite different.

Mr. RHODES. In other words, this is a matter of building brand-new hardware, but the same principles are involved; is that about right?

Dr. VON BRAUN. Yes; to some extent. There is a similarity between them, but you have a two-engine airplane and now you build a four-engine airplane, but you use the same engines although in a different vehicle.

DEVELOPMENT OF LIQUID HYDROGEN AND OXYGEN FUELS

Mr. RHODES. Have we successfully completed testing engines using liquid hydrogen and liquid oxygen?

Dr. VON BRAUN. The CENTAUR is the first one using liquid hydrogen and oxygen and it is sitting on the pad. We almost launched it last week and then when we came to the countdown we had a minor technical flaw.

Mr. HOLMES. We fired the engines.

Mr. RHODES. Static fired?

Mr. HOLMES. One type engine.

Dr. VON BRAUN. We have hundreds of tests with the liquid oxygen on record now. We are really quite confident we will be over the hump.

Mr. RHODES. Actually there is very little difference between the NOVA and the SATURN C–5 except in size?

Dr. VON BRAUN. Except that NOVA is a much more powerful one.

Mr. RHODES. It is a matter of added size and added power?

Dr. VON BRAUN. Yes, sir.

Mr. RHODES. There is no difference in concept?

Dr. VON BRAUN. No fundamental difference in concept; no, sir.

COMPARISON OF LIQUID AND SOLID FUELS

Mr. HOLMES. We are still observing the possibility of using solid propulsion in the first stage. We are siting our launching sites so we do not prevent ourselves from doing that.

Mr. RHODES. In the first stage of the NOVA?

Mr. HOLMES. Yes, sir.

Mr. RHODES. Instead of the F–1 engine you have one single engine using a solid propellant?

Mr. HOLMES. It might be eight F–1 liquid engines or it might be a complement of solid motors. Our current program is eight F–1 engines.

I want to point out that we still do have that freedom of action to choose between liquid and solid propulsion for the NOVA.

Mr. RHODES. Does that concept add to your weight problem or reduce it?

Mr. HOLMES. The solids in general will weigh more. Their weight in relation to the amount of thrust is usually higher, so you put them in the first stage. Where you can take that kind of weight in the first stage and use a higher efficiency fuel in the upper stages, you do so. In general, the solid first stage would certainly weigh more than a liquid-fueled vehicle.

Mr. RHODES. I am interterested in why you want to use the solid propellant at all, or why you would consider it?

Mr. HOLMES. There are studies showing certain advantages either way.

Mr. RHODES. You mentioned they might use a solid propellant in the first stage of the NOVA.

Mr. THOMAS. Is that a working arrangement with the Defense Department?

Off the record.

(Discussion off the record.)

DEVELOPMENT OF SOLID FUELS

Mr. RHODES. Do you want to go ahead with the possibility of the solid propellant on the NOVA?

Mr. HOLMES. As was indicated, we are still considering solids which do offer some advantages in simplicity, once we were certain they could be built and operated successfully in the large sizes our moon missions would require.

We are trying to weigh this and in our NOVA siting of launch sites at Cape Canaveral and so forth, we are siting them so it will be possible to use solids should the early development we have done, or are having done now, by the Air Force shows there might be some advantages to it.

Mr. RHODES. What does the Air Force charge NASA for doing this work on solid propellants?

Mr. HOLMES. They are funding their work entirely themselves.

Dr. SEAMANS. That is correct.

Dr. DRYDEN. There is $40 million in the Department of Defense that is for development of large solid propellants. This is in addition to the money being spent on the development of a 120-inch solid propellent motor to be used in the TITAN III booster.

Mr. RHODES. They feel there is enough military value attached to this so that they do not charge you for it?

Dr. DRYDEN. This is really a decision in the executive branch that the Department of Defense, because of their experience with POLARIS and MINUTEMAN, should proceed with this development, and that the cost of it should be carried in their budget rather than ours.

NEED FOR ADVANCED SATURN AND NOVA

Mr. RHODES. Gentlemen, it seems to me that this advanced SATURN is nothing but a baby NOVA and I wonder why you are building it? What is the reason for the advanced SATURN?

Mr. HOLMES. There is a huge step upward between the present SATURN C–1 with its 1.5 million pounds of thrust and the advanced SATURN C–5 and its 7.5 million pounds thrust. Indeed, the APOLLO mission as presently conceived is based primarily on the advanced SATURN. In developing these missions, one must have a complex of vehicles. No one has built a vehicle the size of either the advanced SATURN or the larger NOVA of some 12 million pounds thrust. As you can see by its funding and schedule, the NOVA is scheduled behind the advanced SATURN by a period of 6 months to 1 year. I feel that it is absolutely essential we go ahead with the advanced SATURN. As we proceed on the NOVA, we may well find that it should be made even larger than a 2-to-1 ratio, an even higher thrust than 12 million pounds.

Mr. THOMAS. What is the biggest thing the Russians have that we know of?

Dr. DRYDEN. Eight hundred thousand pounds.

Mr. RHODES. One million pounds of thrust in the first stage, I think.

Mr. Chairman, in my mind, and I could be wrong, this is the first we have ever heard of the SATURN C–5.

Did the justifications last year cover this?

Mr. HOLMES. Yes; an advanced SATURN was in the planning but it was called the C–2. We have since studied bigger configurations but the need for a vehicle between C–1 and the NOVA was known then. We had since placed larger numbers of engines in the first stage, the C–5 nearing a SATURN configuration with five F–1 engines.

Mr. JONAS. I can follow you in your argument that you need to advance by stages to profit by mistakes, but I think when you build both of these at the same time you destroy that opportunity. You are just going to be 6 months behind the advanced SATURN with NOVA so you have got to be building both of them at the same time?

Mr. HOLMES. We are more like a year behind with the NOVA.

Dr. VON BRAUN. I think the pacing item in NOVA is the M–1 engine which is just going under contract now. This is the engine necessary for the NOVA second stage.

Mr. RHODES. Doctor, is that not the one that is to be tested with the CENTAUR?

Dr. VON BRAUN. No, sir. The CENATUR has a little 15,000-pound engine. The M–1 will be a 1.3-million-pound engine. This engine is just now starting under development. The first $26 million required

for that development is in the 1962 supplemental. The contractor does not even have that money yet. It has always taken at least 4 years before an engine has reached the point where you could put it into a rocket and mate it with the structure of the rocket.

NOVA could not possibly fly before mid-1967.

Mr. RHODES. When can SATURN C–5 fly?

Dr. VON BRAUN. 1965, because SATURN C–5 uses an engine in the first stage that already has 3 years' development on record and the second stage engine is in its second year of development.

USE OF SATURN AND NOVA

Mr. JONAS. If NOVA does fly, it will make the SATURN as obsolete as the model A Ford made the model T Ford, will it not?

Mr. HOLMES. No, sir.

Dr. VON BRAUN. The SATURN is only as obsolescent as the DC–7 became when the DC–8 jets were introduced, although DC–7's will continue to perform essential jobs for many years yet.

Mr. JONAS. If you have a NOVA, you would not need SATURN?

Dr. SEAMANS. We would want to use advanced SATURNS for all of the circumlunar flights.

Mr. HOLMES. You would not use this huge NOVA vehicle for payloads that the advanced SATURN could carry?

USE OF NOVA FOR DEEP SPACE MISSIONS

Dr. DRYDEN. I think another way of setting it into perspective is to say that NOVA will certainly be needed if we are going beyond the Moon to Mars and Venus.

We think we can get to the Moon with smaller advanced SATURNS by using two of them in rendezvous maneuver. This can be accomplished a year or two earlier than possibly could be achieved by the direct ascent with a NOVA. Some of us feel that the development of NOVA may be greatly affected by the way in which the ROVER or rather the NERVA nuclear powerplant develops. It may be that NOVA would become a somewhat different vehicle if nuclear power comes into the picture.

Dr. VON BRAUN. In the third stage.

Mr. YATES. Is it developing a nuclear plant?

Dr. DRYDEN. Aerojet-Westinghouse.

Dr. SEAMANS. We are in the process of selecting a contractor for the stage itself, a test bed, if you will, for inflight experimental testing. This is our rift stage, reactor inflight test.

Dr. DRYDEN. First, we tried on the SATURN vehicle——

Mr. RHODES. Is that your space vehicle, one with a nuclear engine? Is that not the one that you send around the solar system?

DEVELOPMENT OF DIRECT ASCENT AND RENDEZVOUS SYSTEMS

Dr. DRYDEN. As I said, I think probably the deep space missions will go over to nuclear powerplants as they become available. Let me state the philosophy of this program: We made a commitment to the President, the Vice President, the space council and you to land a man on the Moon before the end of this decade. As we see the problem

now, we think that this job can be done with a rendezvous method and this increase in the number of engines in the advanced SATURN came from the decisions to try to do this job by means of rendezvous. If we find that we are not able to do this mission by rendezvous, we would be in a bad way. Therefore, we have proposed to preserve a minimum flexibility by scheduling work on the NOVA to assure the direct ascent approach a year or so behind what rendezvous might achieve but still, hopefully, to accomplish this mission by 1970, if it had to be done by that method.

As this program goes along, we must study every method of getting to the Moon. There are some people who have advocated rendezvous in orbit around the Moon and others have advocated rendezvous on the Moon itself, much as you would send an expedition, let us say, to the jungle by loading supplies by parachutes. Having done this, and after getting supplies in, they would put the men down and hope that they could put together the vehicles to come back.

As we see the situation now, the Earth orbit at the moment looks best because, if the two vehicles do not meet, the man can come home safely and reenter just as the MERCURY capsule reenters. If you try to rendezvous in a lunar orbit and the two do not meet, the man is out of luck. If you try to rendezvous on the Moon and do not get the pieces close enough together so that the men can put this together to come back, the expedition is lost.

As we see it at the moment, we are putting our bets on a rendezvous with two advanced SATURN's. But we feel we must, so to speak, consider the other possibilities of doing something else, if we should run into trouble.

Mr. HOLMES. This is where our systems engineering concept is underway to try to determine this.

Dr. VON BRAUN. I do not think you should consider NOVA as a duplicate because we need a follow-on program anyway.

Mr. THOMAS. Is there any competition between the M–1 engine and your experiments on the atomic engine?

The answer is obviously no, for the simple reason that this M–1 engine is one of your powerful engines for getting these things off the ground, and your atomic powerplant will be the second stage; is that right?

Dr. VON BRAUN. The third stage.

Dr. DRYDEN. It will be in the advanced stages rather than the bottom stages.

Mr. RHODES. Mr. Chairman, we are going to fill the skies so full of hardware you will not recognize it.

Dr. VON BRAUN. Just to give you an idea, two NOVA's with nuclear third stages rendezvousing in Earth orbit can carry a manned expedition to Mars. That is where the follow-on capability comes in.

SPACE STATIONS

Mr. YATES. How close are you to having space stations?

Dr. SEAMANS. What do you mean by space stations? Spacecraft such as APOLLO? In 1964 or 1965 we will have three astronauts up in APOLLO on spacecraft on fairly long duration flights. However, for space stations that would stay up for months, for example, we are planning for a capability by the end of this decade.

Dr. DRYDEN. Yes; before this if we could give that a priority.

Mr. YATES. Doctor, if you do not have a space station that would stay up indefinitely, are you able to refuel one and provide the necessary power to direct the orbit?

Dr. DRYDEN. Yes, sir.

Mr. EVINS. Is the President setting the stage for this objective or is NASA setting it for the President?

Dr. DRYDEN. This objective of the lunar landing was set by the President on the advice of Vice President and Space Council who had quite extensive discussions with various people in the Government and people from private life.

METEOROLOGICAL SATELLITE SYSTEMS

Mr. THOMAS. Gentlemen, let us take a look at the meteorological satellites. There is a total program of $51 million in 1963 against a total of $54 million in 1962.

Insert in the record pages RDO 6–1, 2, and 3.

(The pages referred to follow:)

METEOROLOGICAL SATELLITE SYSTEMS

Summary of requirements

	1961	1962	1963
Advanced research	$1,870,000	$1,865,000	$1,808,000
Advanced technical development	2,005,000	4,510,000	9,605,000
Flight program	15,735,000	47,935,000	39,772,000
Total	19,610,000	54,310,000	51,185,000

OBJECTIVES

The primary objective of the meteorological satellite systems program remains that of establishing and continually improving a meteorological satellite capability for worldwide coverage, to provide the meteorologist with observations of atmospheric elements and storm systems. Observations obtained by meteorological satellites should improve weather prediction procedures and increase our understanding of atmospheric processes. The phenomena to be observed include cloud cover, storm location, precipitation, temperature, wind direction, heat balance and water vapor and other constituents of the atmosphere. An effective meteorological capability will require the development and flight testing of earth-stabilized satellites for 500- to 1,000-mile altitude polar orbits and of stationary satellites for 22,300-mile altitude equatorial orbits. Related developments will include suitable on-board detection equipment including television, infrared detectors, spectrometers, radar and spherics; and the development of adequate data storage, processing, communications and presentation equipment and techniques.

The long-range objective of the program continues to be the development of the principles and prototypes for a system of instrumented orbiting satellites and of the appropriate data processing and communications equipment to provide the National Meteorological Center of the Weather Bureau with worldwide meteorological information. These data will be used operationally, disseminated nationally and internationally, and made available to the National Weather Records Center archives for research and climatological purposes.

This program also includes the development and launch of instrumented meteorological sounding rockets to obtain improved data on temperatures and winds. These rocketsondes are effective at levels above those observable by radiosondes or indirect satellite techniques, and below those where satellites can orbit and make ambient measurements.

JUSTIFICATION

The earth satellite is a new observational tool which has already demonstated its value to the science of meteorology and to the practice of weather forecasting. Satellites will not provide all necessary meteorological information, but they have already supplied tremendous amounts of useful meteorological data not available from conventional observational techniques. Satellites can potentially give global coverage of some meteorological parameters, in contrast to the 5 to 10 percent coverage provided by ordinary methods and, because of their unique vantage point above the atmosphere, make new measurements possible. These data will improve basic scientific understanding of atmospheric processes and lead to a more comprehensive knowledge of world and regional climatology which should produce advances in weather forecasting.

The benefits to be derived from improved capabilities in meteorology include protection of life and property from weather disasters; safeguarding transportation; crop planning, control and protection; industrial planning of weather-dependent products, outdoor enterprises, and heating and cooling loads; convenience in planning personal activities; eventual limited weather modification and control; and good will in return for providing current global meteorological data to other nations. In addition the same meteorological data required for worldwide civilian needs can, with proper handling, meet special military needs as well.

The requirements for an operational meteorological satellite system, anticipated benefits and a proposal for implementing such a system have been set forth in the "Plan for an Operational Meteorological Satellite System" prepared by the Panel on Operational Meteorological Satellites under the auspices of the National Coordinating Committee for Aviation Meteorology and with participation of representatives of the U.S. Weather Bureau, the Department of Defense, the Federal Aviation Agency and the National Aeronautics and Space Administration. In accordance with the May 1961 request of the President, Congress appropriated $48 million to the Weather Bureau in September 1961 to initiate implementation of an operational meteorological satellite system. The plan contemplates the maximum operational use of data from the NIMBUS research and development program, an increased number of spacecraft (using Weather Bureau funds) in the program to insure the continuity of working satellites in orbit, and the transition to fully operational status upon the conclusion of the presently scheduled NIMBUS research and development program. This plan will permit the earliest establishment of a limited operational capability. The establishment of a fully effective operational meteorological satellite system is dependent upon the completion of the improvements contemplated in the presently scheduled NIMBUS research and development program. The Weather Bureau will transfer funds to NASA to augment the program with additional spacecraft and launch vehicles, and to build ground read-out stations specifically required for operational use.

The development of an operational system depends not only upon specific flight projects but also on sustained programs of advanced research and advanced technical development. The advanced research program deals with the reduction and processing of meteorological satellite data and includes feasibility and initial design studies of more complex sensory systems and advanced satellite configurations. The advanced technical development program provides improved satellite instrumentation and equipment to measure and interpret critical atmospheric parameters.

Progressively more sophisticated meteorological satellites will be flown, capitalizing upon the experience gained from previous spacecraft. The flight program was begun with the successful launchings of TIROS I, II, and III, and at least four additional TIROS launchings are planned for the remainder of fiscal year 1962 and early fiscal year 1963. Four R. & D. NIMBUS spacecraft are planned for launch beginning in fiscal year 1963. The first NIMBUS, which will be earth-stabilized and in a near polar orbit will operate concurrently with the last TIROS. Operational NIMBUS spacecraft will be interspersed with these progressively more advanced research and development NIMBUS flights. Funds for these operational NIMBUS satellites and launch vehicles and their support, are not included in this budget, but will be requested separately by the Weather Bureau in Department of Commerce budget submissions. Still later a more advanced satellite called AEROS is planned. A single AEROS stationary satel-

lite will provide continuous data coverage for nearly a third of the earth's surface. The planned satellite flight schedule follows:

Mission R. & D.	Weather Bureau	Launch vehicle	Calendar year of launch
TIROS I		THOR-ABLE	1960 [1]
TIROS II		THOR-DELTA	1960 [1]
TIROS III		THOR-DELTA	1961 [1]
4th TIROS		THOR-DELTA	1962
5th TIROS		THOR-DELTA	1962
6th TIROS		THOR-DELTA	1962
7th TIROS		THOR-DELTA	1962
1st R. & D. NIMBUS		THOR-AGENA	1962
2d R. & D. NIMBUS		THOR-AGENA	1963
	1st Weather Bureau NIMBUS	THOR-AGENA	1963
	2d Weather Bureau NIMBUS	THOR-AGENA	1964
3d R. & D. NIMBUS		THOR-AGENA [2]	1964
	3d Weather Bureau NIMBUS	THOR-AGENA	1964
	4th Weather Bureau NIMBUS	THOR-AGENA	1964
4th R. & D. NIMBUS		THOR-AGENA [2]	1965

[1] Successfully launched.
[2] Substitution of the ATLAS-AGENA may be required to carry the full complement of instrumentation. The Weather Bureau funds its own NIMBUS flights.

Meteorological sounding rockets are the only feasible vehicles for acquiring data in the 100,000- to 300,000-foot layer of the atmosphere. This layer is above the altitudes normally reached by radiosonde balloons, is not amenable to indirect sensing techniques from satellites and is below the altitudes where satellites can orbit and make ambient measurements. The small samples of data obtained indicate that significant meteorological processes take place at these altitudes. This layer may hold the key to an understanding of how changes in the sun's radiations influence the weather. Furthermore, these levels may be utilized by future highflying aircraft and are known to be critical for reentering space vehicles. Data on the winds and temperatures at such altitudes have been obtained with various techniques, but the most successful is the exploding grenade experiment. This program will continue, using approximately 30 sounding rockets in fiscal year 1963, to provide required additional data, develop improved techniques, and extend present techniques to higher altitudes.

NUMBER AND COST OF VEHICLES

Mr. THOMAS. How much money is Dr. Reichelderfer going to spend in this program in addition to this? Most of your money is in your boosters payload, is it not?

Mr. STOLLER. This $39 million in this budget is for the work for the TIROS series this year and intended to overlap the early NIMBUS satellites.

Mr. THOMAS. How many TIROS are you going to get out of this money?

Mr. STOLLER. With the money already appropriated and with this $3.4 million, roughly, we asked for this year, this will enable us to get seven TIROS finished and assembled. If it is necessary to go beyond that, we would have to come back in future fiscal years.

Mr. THOMAS. What is your TIROS and NIMBUS going to cost? Do you have a unit cost on any one of them? How many TIROS do you have now?

Mr. STOLLER. The funds you find here for TIROS will run up very quickly, around $26 million in 1961, 1962 and 1963 for TIROS which covered seven spacecraft and production launch vehicles. This does not cover the total cost of the TIROS program because we used a certain number of developmental DELTA vehicles which were funded

as DELTA development costs to support TIROS flights. Every TIROS flight gets in this seven but does not show its vehicle cost in this particular tabulation.

Mr. THOMAS. What does it all add up to? How much will they be apiece?

Mr. STOLLER. It is about $5 million per spacecraft and around $2.5 million a launch vehicle launched.

ADVANCED TECHNICAL DEVELOPMENT

Mr. THOMAS. You have advanced technical development here, $9.6 million, and you have already spent $6.5 million. Is this all instrumentation or what?

Mr. STOLLER. The advanced technical development line is the material on page 6–4.

Mr. THOMAS. I am looking at it now. What does it mean?

Mr. STOLLER. This is instrumentation development.

Mr. THOMAS. Is it all instrumentation development?

Mr. STOLLER. Not all of it. There is a large chunk in there on the 1963 line for AEROS component development which is not entirely instrumentation. Part of it would be control systems.

CONTRACTORS FOR METEOROLOGICAL SATELLITES

Mr. THOMAS. Who were the contractors?

Mr. STOLLER. The contractors in the past have been such people as the Signal Corps who worked on instrumentation for TIROS. We have used the RCA people on the advanced electrostatic recorders and the Raymond Engineering Co. who have been working on tape recordings.

We have used a number of companies in infrared development.

Mr. THOMAS. Who developed the bird for you?

Mr. STOLLER. The TIROS was built by RCA Astro-Electronics Division in Princeton, N.J.

Mr. THOMAS. What was your power there? What type of engine?

Mr. STOLLER. It is powered by solar cells with storage battery packaged inboard which is recharged by solar cells where the power is available on a programed basis for the operation of the satellite.

Mr. THOMAS. Who made the booster to get it off the ground?

Mr. STOLLER. The TIROS series has been launched by the DELTA and DELTA is the responsibility of the Douglas Co.

Mr. THOMAS. How much thrust does that booster have?

Mr. STOLLER. I think the original version was 150,000 pounds and now it is 165,000.

Dr. DRYDEN. The first stage is the THOR.

SATELLITE ACCOMPLISHMENTS

Mr. THOMAS. What do we get for our money here, Dr. Dryden? Do you have a satisfied customer in Dr. Reichelderfer?

Dr. DRYDEN. Very much so, much to our surprise. These earlier developmental vehicles proved so useful the results were immediately fed into the normal weather forecasting service. I read in the paper the other day that they are now broadcasting by radio facsimile cloud analyses which come from TIROS essentially to all other countries.

FUNDING RESPONSIBILITIES FOR METEOROLOGICAL SATELLITES

Mr. THOMAS. Do you get any contributions from the Weather Bureau, or do you pick up the check for all of it?

Dr. DRYDEN. The development of the meteorological satellites is entirely a NASA responsibility. The Weather Bureau has responsibility for funding an operational system using NIMBUS satellites.

Mr. THOMAS. $20 million?

Mr. STOLLER. $48 million last year. There is a request for $45 million this year.

Dr. DRYDEN. Of the $48 million, nearly——

Mr. JONAS. Off the record.

(Discussion off the record.)

FUNCTION AND OPERATION OF NIMBUS

Mr. THOMAS. What are you going to do with NIMBUS? What are you going to do with it that TIROS is not doing?

Mr. STOLLER. The NIMBUS satellite we can earth-stabilize. It will always be looking at the earth from a polar orbit and will help solve one of these problems we have just mentioned here, the fact we will have more continuous coverage of the earth's surface. It was unfortunate, for instance, that our present TIROS was not in the right position above the earth to observe and give warning of the recent storm which ravaged the Atlantic coast.

Mr. THOMAS. What altitude is it going to be in orbit?

Mr. STOLLER. The orbit is 600 miles. It will be in approximately polar orbit rather than in the inclined orbit the TIROS is in now. TIROS is stabilized by the fact that it spins about its axis. As it goes around the world, once in its orbit at least, it is pointing away from the earth entirely and there it sees no part of the earth's surface. With the NIMBUS control system, hopefully we will have a satellite always pointing itself at the earth's surface.

SOVIET METEOROLOGICAL SATELLITE PROGRAM

Mr. THOMAS. Does anybody have any of these weather satellites functioning now, other than the United States? Do the Russians have one?

Mr. STOLLER. The Russians releases indicate there might be some meteorological equipment in the last one they fired. We have not seen any details on that.

Dr. DRYDEN. From the discussions in New York, Mr. Chairman, it seems apparent that they expect to launch some meteorological satellites very soon. As we read the releases they have put out, in the last series of what they call "Cosmos scientific satellites," one in that series certainly has photographs of clouds. It indicates that the Russians might be prepared to coordinate launchings of meteorological satellites.

Mr. THOMAS. If the Russians have any satellites floating around and making orbit, we can certainly pick it up with our tracking system, can we not?

Dr. DRYDEN. We can pick up the satellites.

Mr. THOMAS. We do not know what the satellite is doing, but we can pick it up?

Dr. DRYDEN. We can record telemetry from their satellites but we cannot always decipher what it means without further knowledge.

Mr. THOMAS. If they have a satellite up, we can pick it up, can we not? What it is doing or what is is saying, that is something else.

Dr. DRYDEN. We can record the telemetry from it and the question then, not having the code, is like cracking a cipher.

Mr. EVINS. Doctor, were you able to bring out anything in the conference as to what the Soviets are doing?

Dr. DRYDEN. Not really. Mr. Blagonrarov said he is going to report on his meeting at the end of the month and if it is like previous reports, it is going to be in generalities rather than specifics.

WEATHER SATELLITE PROGRAM FOR 1963

Mr. THOMAS. How many weather satellites are we going to put in fiscal year 1963?

Mr. STOLLER. Three more TIROS and, hopefully, two NIMBUS, if everything goes well. If we have delays in development work, it might be the first NIMBUS only.

Mr. THOMAS. The prospects look like it is good for four and maybe five?

Mr. STOLLER. Yes.

CUMULATIVE COST OF NIMBUS

Mr. THOMAS. What are those five going to cost?

Mr. STOLLER. Those will be the ones that are indicated here for the first and second NIMBUS. The cumulative costs on the NIMBUS up to that point——

Mr. THOMAS. I mean salaries, expenses, getting them in orbit and everything else. What will the total cost be?

Mr. STOLLER. Probably over $60 million, considering the cumulative costs.

Mr. THOMAS. $54 million does not cover it?

If you take salaries, expenses, and all of your research and development work, this $51 million will not do it, and a better figure would be around $75 million?

Mr. DEMBLING. This includes salaries and expenses.

Mr. STOLLER. The NIMBUS cumulative costs through fiscal year 1963 are $73 million.

Mr. THOMAS. Alone?

Mr. STOLLER. Yes, sir. This includes a number of these.

COMMUNICATIONS SATELLITE SYSTEMS

Mr. THOMAS. Let us take a look at communications satellites. Put pages RDO–7–1 and RDO–7–2 in the record.

(The pages referred to follow:)

COMMUNICATIONS SATELLITE SYSTEMS

Summary of requirements

	1961	1962	1963
Advanced research	$1,250,000	$1,170,000	$2,688,000
Advanced technical development	790,000	2,272,000	2,473,000
Flight program	31,793,000	45,035,000	80,216,000
Total	33,833,000	48,477,000	85,377,000

OBJECTIVES

The objectives of space exploration can be broadly categorized as (1) the advancement of man's knowledge of the universe, leading to a better understanding of its workings, and as (2) the application of this knowledge, resulting in tangible benefits to mankind.

One application of the use of space which has great potential for aiding all mankind is the field of worldwide communications. By making use of satellites as relay stations between earth terminals dispersed about the globe, the quality of long-distance radio communications can be greatly improved, and many countries which are now dependent on the uncertainties of high-frequency radio for communicating with other locations in the world can be linked to distant areas with microwave circuits which will be as effective as those now used in domestic service.

The objective of the communications satellite systems program is, therefore, the pursuit of research and development to give maximum assurance of rapid and continuous scientific and technological progress toward operational global communications satellite systems for civilian use.

JUSTIFICATION

The effective conduct of the Nation's business depends on fast, reliable communications. In the political, economic and social fields the capability for rapid transportation of people and goods and for communicating over great distances has become essential. Also, in contrast to pre-World War II times, the travel and communications must necessarily be to and with all parts of the world.

Great strides have been made in international communications between the United States and Europe. The installation of transatlantic telephone cables has broadened the communications base between those continents, and more cables are being planned for this service and for service to Asia. However, it has been the experience of the communications industry that as new kinds of service are offered, the demand grows rapidly and soon overtakes the supply.

High-frequency radio, used for the present worldwide communications system, is not a reliable means of communication. It depends for its use on the ionosphere, which varies diurnally, seasonally, and geographically. In addition, the capability of the ionosphere for reflecting radio waves in the high-frequency region of the spectrum varies with the 11-year sun-spot cycle. During periods of high solar activity, such as occurred between 1957 and 1959, the ionosphere is capable of reflecting radio waves over a range of frequencies between approximately 3 and 50 megacycles; when the solar activity declines to low levels, frequencies above 20 megacycles are seldom reflected. In the latter case, the number of communications circuits possible would be decreased by more than 60 percent.

Neither high-frequency radio nor present submarine cables provide television and high speed data transmission. These services, as well as most of the long lines telephone calls, are normally carried within the United States by microwave radio. However, for all practical purposes, communication by microwave is limited to points within line-of-sight of each other.

Communications satellites offer the possibility of microwave communication over long distances by providing relay stations at altitudes where they can be viewed simultaneously from all points within vast areas of the earth's surface.

Thus they offer the potential for providing all types of telecommunications services on a worldwide basis.

The NASA communications satellite systems program is designed to advance by research, technical development and space flight the technology for application of these systems to civilian use. Both active and passive systems are being pursued. Satellites of both types have already been flown, either by NASA or the Department of Defense, and have demonstrated the fundamental feasibility of these systems. Detailed investigations of alternative configurations for the eventual operational system are now required.

OPERATION OF COMMUNICATIONS SATELLITE PROGRAM

Mr. THOMAS. You have a figure of $85.3 million in 1963 as against $48.4 million in 1962.

Tell us about this, Doctor.

Mr. STOLLER. The communications program consists of two basic areas; one is a continuation of the passive satellite work where we reflect signals from an inert satellite from point to point. The other portion of it consists of active satellites where the satellites carry transmitters and receivers and amplify the signals relayed from point to point. In the active satellite portion we are working at two altitudes; the low altitude which is exemplified by the relay satellite which we have on contract.

Mr. THOMAS. How much are you going to spend on that?

Mr. STOLLER. The flight program is the largest item. That which you see in fiscal year 1963 includes the advanced work which has to be started. The breakdown on the passive part is shown on pages RDO-7-6 and RDO-7-7.

Mr. THOMAS. What has been the total cost on this? We have been working on this since before 1961?

Mr. STOLLER. That is right. The cumulative cost for the various experimental flight satellite systems—ECHO I, ECHO II, ECHO III, SYNCOM, REBOUND—the cumulative cost to 1962 is $76 million.

Mr. THOMAS. Now you want to add $85 million this year?

Mr. STOLLER. That is right.

Mr. THOMAS. This is going to be a continuing program for no telling how many years, but this has all the possibilities of revolutionizing communications systems, cable and otherwise, as far as long lines are concerned, is that right?

Dr. DRYDEN. As I recall, a single satellite has more capacity than all the cables now installed between here and Europe.

Mr. STOLLER. That is right. One of these experimental satellites will do much better than all the transatlantic cables.

Mr. THOMAS. How are you going to spend the $80 million on the flight program alone?

REBOUND PROJECT

Mr. STOLLER. On the flight program, the first major item is the $16 million for the REBOUND segment on page 7. REBOUND is a multiple launch project.

Mr. THOMAS. You have REBOUND at $16.7 million, RELAY at $19 million——

Mr. STOLLER. $4 million for SYNCOM, second increment, $21 million for the intermediate altitude satellite.

Mr. THOMAS. What does that mean?

Mr. STOLLER. REBOUND is a multiple launch satellite, meaning we launch more than one passive satellite at the same time. If you are going to make effective use of a medium-height orbiting satellite, you must put many in orbit so that you always have one visible between stations.

Mr. THOMAS. What is it going to look like and what is it going to to be composed of?

Mr. STOLLER. Most probably a spherical reflector similar to the ECHO sphere, perhaps larger, with a metallic wall, but it will be essentially similar.

Mr. THOMAS. Is that the one we had brought over here several years ago, Dr. Dryden?

Dr. DRYDEN. Smaller ones.

Mr. THOMAS. What was that material?

Dr. DRYDEN. Milar with aluminum.

Mr. THOMAS. How long is that going to last?

Dr. DRYDEN. ECHO I is still up, but somewhat wrinkled and shriveled. We thought it would last 3 weeks. It has been up more than 2 years.

Mr. THOMAS. What was it filled with?

Dr. DRYDEN. It originally had a material giving off vapor slowly, anthraquinone.

Mr. THOMAS. It inflates itself?

Dr. DRYDEN. Yes.

Mr. STOLLER. It is a chemical which, under the influence of heat, vaporizes and expands. There were holes in the satellite, some punched to prevent its filling up too quickly, some undoubtedly made by micrometeorites.

Mr. THOMAS. How was it put up?

Mr. STOLLER. By the DELTA launch vehicle, a THOR-based booster. It was packed into a small round canister.

COST OF SINGLE LAUNCH

Mr. THOMAS. What is the big matter of expense, getting the reflector in orbit?

Mr. STOLLER. In the case of the single sphere the major cost is the booster.

Mr. THOMAS. Do we lose the booster?

Mr. STOLLER. Yes, in every launch.

Mr. THOMAS. What does it cost?

Mr. STOLLER. In the single launch ECHO shot already made, the booster cost was about $2.5 million launched.

STUDIES ON RECOVERABLE BOOSTERS

Mr. RHODES. I have heard some conjecture about the possibility of recovering these boosters. Has that been explored? If you could recover them, could they be restored to condition to fire again economically?

Mr. STOLLER. These studies have not, I think, turned out to be economical with the smaller boosters. These studies have been made primarily in terms of the very large boosters.

Dr. DRYDEN. The last study I saw showed you had to have perhaps as much as a hundred launchings of a given vehicle before it would be economical to put on a system of recovery. This takes added weight and means you lose a little payload every time. I there anyone with a more specific answer?

Mr. AMES. We are studying recoverable boosters, those Dr. Dryden mentioned. You have to launch a certain number of these relatively modest size, say THOR and ATLAS size launch vehicles, to make them economical to recover.

The other factor is you must package a very special way the recovery system. This recovery system must be deployed in space and bring the vehicle back. It would probably impact in the water, unless we had some way to turn it around and bring it back to the land. For the modest size of vehicles used today, the idea does not appear to be economical. It does not mean we are not looking at better ideas and better ways of recovering these.

One concept proposed is that we combine the engine and guidance system components and recover some way to use it again, employing the expended fuel tanks as a crushable structure for landing. We have not written off the idea of recovering vehicles.

Mr. THOMAS. Out of your $80 million, the REBOUND vehicle cost $11.8 million, your THOR-DELTA vehicle cost you $6.5 million. When you get through, your instrumentation costs you as much as your vehicles.

Dr. DRYDEN. This is generally true.

CONTRACTOR FOR ECHO

Mr. THOMAS. Who are your contractors for all this? You must have a half dozen or a dozen contractors.

Mr. STOLLER. The ECHO sphere itself is built by the Schjeldahl Co. in Minnesota.

Mr. THOMAS. That is a small cost.

COST OF COMMUNICATIONS SPHERES

What does the sphere itself cost?

Mr. STOLLER. I think probably less than a million dollars in the total contracts for spheres built to date.

Mr. THOMAS. You do not mean to say the ball costs a million dollars, do you?

Dr. DRYDEN. Total cost.

Mr. THOMAS. What is a good opinion of the cost of one of them? What is the cubic content of it?

Dr. DRYDEN. I would guess $100,000 to $200,000.

Mr. AMES. The cost of the ECHO I spheres was around $400,000, including test shots.

Mr. STOLLER. Each sphere is probably of the order of a hundred thousand dollars.

Mr. THOMAS. What makes it cost that much?

Mr. STOLLER. There is a great deal of labor that goes into that contract involved not only in just the material but the fabrication, sealing, folding. There is a very special folding and packaging technique that goes as part of the sphere contract in addition to just fabricating the foil into a spherical shape. We contract to another organization in case of our present ECHO work, Grumman, for a canister into which this sphere itself is packaged. We also contract with the Siegler Corp., which built the television equipment.

Mr. THOMAS. What type of company would have the know-how to do this?

Dr. DRYDEN. The sphere itself?

Mr. THOMAS. Yes.

Dr. DRYDEN. The companies that build these big plastic balloons. Schjeldahl is one, General Mills is another. Those two companies have made a speciality of these large inflatable structures. I think they also, some of them at least, have built these plastic exhibit halls that are held up by air pressure.

SOUNDING ROCKETS

Mr. THOMAS. Let us look at sounding rockets. Mr. Reporter, put pages RDO 8–1, 2, 3, 4, and 5 in the record.

(The pages referred to follow:)

SOUNDING ROCKETS

Summary of requirements

	1961	1962	1963
Advanced research	$419,000	$617,000	$784,000
Advanced technical development	1,386,957	1,046,638	1,685,000
Flight program	10,524,043	12,597,362	16,688,000
Total	12,330,000	14,261,000	19,157,000

OBJECTIVES

To investigate geophysical phenomena from the earth's surface out to one earth's radius. To perform astronomical observations by measuring the radiation arriving from the other celestial bodies from above the obscuring and distorting effects of the earth's atmosphere. To investigate the structure of the atmosphere, the ionosphere, the geomagnetic field, energetic particles, and the chemistry of and solar effects on the upper atmosphere. To flight test instrumentation prior to use in satellites and space probes.

JUSTIFICATION

A substantial expansion of the sounding rocket program is planned for fiscal year 1963 to permit continuation of existing research and an expanded program of university research. New experimenters will use sounding rockets as a means to participate in the national space effort. Contracts and grants will be placed with selected universities for preparation of experiments, and engineering support will be provided on a contractual basis to assist the experimenters in preparing their instrumentation for flight. Approximately 160 sounding rocket vehicles will be procured.

FUNDING REQUIREMENTS

Advanced research

	1961	1962	1963
Aeronomy:			
Atmospheric temperature studies	$43,000	$45,000	$51,000
Ultraviolet scattering densitometer and composition		50,000	
Special techniques for atmospheric measurements	66,000	220,000	351,000
Total	109,000	315,000	402,000
Galactic astronomy:			
Design of flight optical systems for interstellar studies	85,000	81,000	131,000
Study of interstellar and intergalactic media	75,000	121,000	151,000
Total	160,000	202,000	282,000
General support: Sounding rocket handbook	150,000	100,000	100,000
Total, advanced research	419,000	617,000	784,000

Most of the advanced research conducted in geophysics and astronomy is funded under the scientific satellite program. However, a limited amount of this research is specifically aimed at the development of techniques for atmospheric and astronomical studies using sounding rockets. Continuation of studies of performance capabilities and design characteristics of available sounding rocket vehicles is also planned. These studies are published in the form of a sounding rocket handbook for use by experimenters in planning flight missions and designing payloads.

Advanced technical development

	1961	1962	1963
Aeronomy:			
Instrumentation for upper atmospheric research	$450,820		
Sodium vapor experiments	392,432		
Ultraviolet spectra of the upper atmosphere		$310,000	
Mass spectrometers	25,000	140,638	$125,000
Magnetic spectrometer development			195,000
Development of cases and gages		88,000	161,000
Total	868,252	538,638	481,000
Energetic particles: Neutron measurements	42,194		
Plasma and ionospheric physics: Electron density probes	138,924	46,000	109,000
Galactic astronomy:			
Soft X-ray equipment	70,587		
Flight detector development for interstellar studies		21,000	90,000
Total	70,587	21,000	90,000
Astrophysics: Radio astronomy		115,000	
Souding rocket systems:			
Transitorized telemeter		40,000	50,000
Dovap development data		100,000	100,000
Aspect sensors		80,000	85,000
Vibration studies	207,000		85,000
PPM/PCM telemetry			40,000
Instrumentation development	25,000	67,000	218,000
14 channel digital tape system			30,000
Wind tunnel studies			50,000
Vehicle systems development	35,000	39,000	347,000
Total	267,000	326,000	1,005,000
Total advanced technical development	1,386,957	1,046,638	1,685,000

Emphasis in this area is on the development of advanced spectrometers, cases and gages for determining the composition, pressure, temperature and density of the upper atmosphere. Work on advanced electron density probes for ionospheric research is being continued, and support is provided for development of astronomical instrumentation by the Goddard Space Flight Center. An expanded effort is also planned for development of improved telemetry systems and data systems for future sounding rocket payloads. Work will also be done on the improvement of existing sounding rockets to give them greater load carrying capability and more precise stabilization and pointing control.

Flight program

	1961	1962	1963
Aeronomy:			
Sodium vapor experiments	$26,100	$204,741	$272,000
Neutral composition of upper atmosphere	276,000	270,000	275,000
Pressure, temperature density measurements	327,000	335,000	260,000
Wind shear and D region correlation		51,898	62,000
Falling sphere accelerometer			175,000
Rocket grenade experiments	448,000		
Ion composition measurements		240,000	285,000
Total	1,077,100	1,101,639	1,329,000
Space chemistry:			
Airglow photometry			215,000
Induced chemiluminescence experiment			315,000
Spectrometry and composition measurements			265,000
Induced airglow reactions			215,000
High resolution ultraviolet photometry			215,000
Earth's albedo and scattering phenomena	170,000	161,000	161,000
Total	170,000	161,000	1,386,000
Micrometeorites: Meteor streams collection program		201,000	115,000
Energetic particles:			
Low energy heavy primary cosmic rays	55,000	57,000	57,000
Nuclear emulsion experiments	440,500	189,000	195,000
Solar beam experiments	135,000	156,000	160,000
Total	630,500	402,000	412,000
Magnetodynamics:			
Investigation of the electrojet	25,943	445,000	330,000
Magnetic fields and ionospheric currents	23,000	75,600	75,000
Total	48,943	520,600	405,000
Plasma and ionospheric physics:			
Electron density probes		23,123	
Langmuir ionosphere probes		140,000	140,000
DC and VLF measurements	161,000	246,000	281,000
RF ionosphere measurements	344,000	326,000	144,000
Measurements of the ionosphere during solar eclipse			270,000
Ionosphere measurements for the International Quiet Sun Year (IQSY)			215,000
Total	505,000	735,123	1,050,000
Galactic astronomy:			
Stellar X-ray mapping			132,000
Ultraviolet photometry	86,000	145,000	273,000
Stellar and nebular spectrometry	633,000	547,000	506,000
Total	719,000	692,000	911,000
Solar physics:			
Solar ultraviolet spectrometry	490,500	307,000	350,000
X-ray spectrophotometry		130,000	242,000
Total	490,500	437,000	592,000
Astrophysics: Radio astronomy			115,000
Meteorology photo probe	146,000	206,000	40,000
Rocket systems:			
Aerobee 100	45,800	165,000	
Aerobee 150/150A	1,048,000	723,000	932,000
Nike Cajun	262,000	270,000	268,000
Iris	252,000		127,000
Argo D-8	152,000	1,008,000	1,449,000
Aerobee 300			151,000
Argo D-4	442,000		441,000
Nike Apache	52,000	163,000	162,000
Arcas			46,000
Aerobee 350			192,000
Total	2,253,800	2,329,000	3,768,000

Flight program—Continued

	1961	1962	1963
General flight support:			
Launcher modifications	55,000	55,000	55,000
Attitude control systems	29,000	360,000	430,000
Ground electronics and instrumentation		104,000	80,000
Airborne electronics		770,000	745,000
Telemetry support	470,000	400,000	395,000
Dovap support	175,000	125,000	125,000
Antenna support	104,000	75,000	75,000
Wind effects	145,000		
Transistorized FM/FM telemeter packages	105,000		
MCR 105 airborne 10 channel command receivers (24)	131,000		
Airborne pulse position telemeter transmitter	70,000		
FM/FM telemetry ground station	52,000		
Supersonic wind tunnel test	50,000		
Mircom model CM-100 video band recorder	60,000		
NERV modifications	126,000		
Argo D-4 vehicle performance study	165,400		
Support services, facilities and materials	1,268,800	1,149,000	1,093,000
Iris—ONR overhead adjustment		56,000	
Despin systems		25,000	25,000
Checkout and launch operations	1,477,000	2,188,000	2,937,000
Engineering services to universities for coordination of fabrication of experiments		505,000	605,000
Total	4,483,200	5,812,000	6,565,000
Total, flight programs	10,524,043	12,597,362	16,688,000

NATURE OF SOUNDING ROCKETS PROGRAM

Mr. THOMAS. How many are you going to fire this year and in 1963?

Dr. NEWELL. About a hundred this year, and we expect the program to level off at between 100 and 165 rockets per year.

Mr. THOMAS. What will we get for this $19 million?

Dr. NEWELL. The $19 million pays for rockets and their instrumentation and the preliminary laboratory research that is required to devise the experiments.

Mr. THOMAS. What altitudes will be required?

Dr. NEWELL. The altitudes will range from below a hundred kilometers out to a couple thousand kilometers.

Mr. THOMAS. They will go up and down but will not be in orbit?

Dr. NEWELL. We do not put anything in orbit in this program.

COST OF ROCKETS

Mr. THOMAS. Do these cost about $250,000 apiece?

Dr. NEWELL. No, they vary. If you use the CAJUN type rocket, the rocket costs between $5,000 and $8,000. If you use the AEROBEE type rocket, it costs about $30,000.

If you jump to the very large rockets like the JOURNEYMAN, you get up to the $100,000 category or $150,000.

Mr. THOMAS. Where are you going to fire these? Are you going to do any on the west coast?

Dr. NEWELL. These rockets for the most part are fired from Wallops Island and Fort Churchill. However, we also introduce special expeditions. For example, we have fired rockets, at the invitation of the Australians, at the Woomera rocket range.

Mr. THOMAS. You are going to spend about $1,400,000 on space chemistry. You have micrometeorites, energetic particles, plasma ionosphere physics, and so forth. How much knowledge have we gained

in the last 3 years on this program where we will have spent about $36 million? This is not all, is it, by any means?

Dr. NEWELL. No, sir, this is not all.

Mr. THOMAS. You remember we built a causeway at Wallops Island. We took over the Navy's installation down there and fixed that up. We will add another $15 million or $18 million.

What have we received for our money in this sounding rockets program?

FUNCTION AND ACCOMPLISHMENTS OF SOUNDING ROCKET PROGRAM

Dr. NEWELL. The sounding rocket program does several things. First of all, it permits you to do some science that you cannot do any other way. Out of that science comes a tremendous amount in information on the earth's atmosphere, and on the ionosphere. I mentioned the practical results from the ionospheric studies the other day.

Mr. THOMAS. Is there any part of your program where we can do a little bragging? If there is, this is it, is it not?

Dr. NEWELL. This is where we got full returns and overflowing from each dollar spent. We have had many hundreds of papers come out of this program in the scientific area.

In addition, the sounding rocket program is used to keep the cost down on some of the other programs by checking out the experiments that are going to be flown in satellites and space probes in advance. We are able to debug these equipments, set the ranges, and so on, so that by the time we use the expensive satellites and space programs we know pretty well that the experiment is going to work.

As a result of this, plus the careful testing program NASA follows, I do not believe we have a satellite that failed once it got into orbit until along about the time it was supposed to.

PARTICIPATION OF DR. VAN ALLEN

Mr. THOMAS. Dr. Van Allen, I guess, makes many contributions to this program.

Dr. NEWELL. He has made many contributions.

Mr. THOMAS. Where is his laboratory? Is it at the University of Iowa?

Dr. NEWELL. Yes, sir.

Mr. THOMAS. Does he have any working space at Wallops?

Dr. NEWELL. No. But many scientists do participate in the sounding rocket program at Wallops.

Mr. THOMAS. Does he come down quite often?

Dr. NEWELL. No; he has gone over into the satellite research for the most part now, satellite and space probe programs.

Mr. THOMAS. Go ahead.

Dr. NEWELL. I had made the point that we do a considerable amount of testing, and in this way insure the success of our satellite and space probe work.

A third use for the sounding rockets is in the preliminary survey type study of the astronomical objects that we will later investigate with the satellites and space probes.

Mr. THOMAS. Off the record.

(Discussion off the record.)

SCIENTIFIC SATELLITES

Mr. YATES. Scientific satellites. We notice an increase in this appropriation to $175,165,000. Mr. Reporter, put pages RDO9–1 and –2 in the record.

(The pages referred to follow:)

SCIENTIFIC SATELLITES

Summary of requirements

	1961	1962	1963
Advanced research	$6,793,824	$13,847,000	$17,418,000
Advanced technical development	6,207,176	13,124,000	16,261,000
Flight program	41,397,000	90,647,000	141,486,000
Total	54,398,000	117,618,000	175,165,000

OBJECTIVES

To increase man's knowledge of the Earth, the Sun, interplanetary space, the universe in general and the relationship between solar processes and geophysical phenomena. More specifically:

(1) To determine and understand the structure, composition and dynamics of the Earth's atmosphere and ionosphere.

(2) To investigate and determine the nature of the great radiation belts, the nature and origin of cosmic rays, the characteristics of other energetic particles in space, the characteristics of magnetic and electric fields, solar activity, the ionospheric and atmospheric conditions, and the relationships among these phenomena.

(3) To understand the origin, present state, and evolution of the universe by observation of the stars, nebulae, galaxies and planets from above the obscuring influence of the Earth's atmosphere.

(4) To investigate the physical processes occurring in the universe including the nature of gravity, the gross features of the Earth's gravitational field and the behavior of elementary particles in rapid motion.

(5) To study the effects of space environment on living organisms.

(6) To provide basic scientific knowledge required for manned and instrumented space flight and for advancement of the state-of-the-art in meteorology, communications, and navigation.

(7) To support international cooperative efforts in the exploration of space.

JUSTIFICATION

Earth orbiting satellites offer a means of conducting comprehensive scientific investigations in space over long periods of time. Direct measurements can be made of geophysical phenomena with accurate reference to time and space. The Earth's ionosphere and atmosphere can be examined in situ and from above, and astronomical observations can be made from above the absorbing and distorting effects of the Earth's atmosphere.

Major emphasis is being placed on the development of geophysical, astronomical and solar observatories capable of carrying a wide variety of experiments using a basic spacecraft, power supply, stabilization system, command system, data storage system and telemetry system in an effort to achieve a high degree of reliability. However, there is a continuing requirement for smaller satellites in special orbits and small space probes to conduct experiments which are incompatible with the larger observatories.

Fiscal year 1963 funds provide for continuation of the development and production of the three types of observatories, for initiation of the development of one SCOUT-sized satellite and a series of geophysical and biological probes for specialized experiments. Fiscal year 1963 funds also provide for continuation of a program of international cooperation, providing launch vehicles and spacecraft for experiments by scientists of the United Kingdom and other countries.

In conjunction with the program of flight experiments, increased emphasis is being placed on support of research and advanced technical development efforts in universities, nonprofit institutions and industry. This research and development effort in the space sciences provides the theoretical framework upon which the program of flight experiments is built. It develops the techniques and instrumentation for the flight experiments and provides for analysis of the data obtained.

DEVELOPMENT OF SCIENTIFIC SATELLITE PROGRAM

Mr. YATES. May we have an explanation of this?

Dr. NEWELL. The satellite program is coming into maturity with the development of observatory-type satellites. In the initial part of the program, as you brought out yesterday, we had a running start on what we could do in Earth physics and space physics research from the International Geophysical Year. We began the program with the smaller satellite, VANGUARD, then the JUNO-type vehicle, going on to the DELTA-type vehicle, and are now moving ahead with the many-hundred-pound satellites like the orbiting solar observatory just launched, to the half-ton satellites like the orbiting geophysical observatory we hope to launch in the next couple of years, and to the ton-and-a-half satellites like the orbiting astronomical observatory we hope to launch in a couple of years.

These larger satellites will permit us to do many experiments at once. There are several advantages to this. First, you can make combined observations of many different things and study their interrelationships. Secondly, the cost per experiment goes way down. Thirdly, it is possible by launching these in a planned sequence to move from a set of discoveries to a rather quick followup to find out more about what those discoveries mean.

A large portion of the increases between 1962 and 1963 is due to moving to these larger vehicles.

SOVIET ACTIVITIES IN SCIENTIC SATELLITES

Mr. YATES. I remember when Dr. Porter appeared before us for the appropriation for the International Geophysical Year. He was impressed with the half-ton satellite that the Russians put up at that time, and pointed out that the size of the satellite permitted them to undertake a number of experiments which he said at that time were about 2 years ahead of our capabilities. Has that proved true? I think this was two or 3 years ago when he testified.

Mr. THOMAS. What became of Dr. Porter?

Dr. NEWELL. He is still working with us. He is Chairman of the Space Science Board Committee on International Relations and works very closely with us and we with him.

It is true that their satellite was ahead of things we could do as a composite experiment. In fact, as I mentioned yesterday, we all have been very much surprised that, with such a good beginning, the Russians waited until just recently to start launching a series of scientific satellites. They were off to a running start, and then for some reason just stopped.

Mr. YATES. Is there any reason you can think of for that?

Dr. NEWELL. I think there are two reasons. One, I think they wanted to concentrate on things that were more spectacular. Secondly, I do not think their economy permitted the broad program that our economy has permitted us.

Mr. YATES. We have sent up more satellites than the Russians containing scientific instruments. In the total number of the experiments we have undertaken, have we equalled or surpassed the experiments of the Russian satellites?

Dr. NEWELL. I think we have gone way beyond.

Dr. DRYDEN. We think this is one factor in their resuming their scientific program. It is rather interesting that in these recent satellites this is the first time the Russians have stepped down in capability. They always wanted bigger, better, heavier. Here they seem to have gone back to a smaller ICBM that they have been developing this past summer in the Pacific shots.

These apparently are smaller vehicles, smaller satellites, devoted entirely to scientific measurements. We think in part this is the result of the tremendous international response to the accomplishments of our own program.

EXCHANGE OF SCIENTIFIC INFORMATION WITH THE SOVIET UNION

Mr. YATES. Is there an exchange of information derived from scientific satellites between the U.S.S.R. and the United States?

Dr. NEWELL. The U.S.S.R. does publish the basic research results from their sounding rocket and satellite program. However, they seem to publish more slowly than we do and in some cases compromise their publications by not revealing basic data that would indicate what their tracking or launching capabilities were. For example, details on orbit that the scientist would need to judge their publications are not presented, whereas, we do present this.

Mr. YATES. These are essentially nonmilitary experiments?

Dr. NEWELL. Yes.

Mr. RHODES. In other words, they expect you to take their figures on face?

Dr. NEWELL. That very often is the case.

Mr. RHODES. Without the necessary data to prove they are either right or could be wrong?

Dr. NEWELL. That is correct.

Dr. DRYDEN. Similar to the absence of data on their manned flights where they give practically no details.

Mr. RHODES. When they make a publication like that where their data cannot be proved, is there any real scientific value to the data which is furnished?

Dr. NEWELL. Sometimes there is and sometimes there is not. Where it is data on the structure of the atmosphere and what happened on a given day, we can use that, but where we have to try to fit this into a real theoretical understanding of what is going on, we tend not to use that data because we only want to use data we can trust and really know about.

Mr. RHODES. It is sort of like giving you the safe and not giving the combination.

Mr. YATES. That raises an interesting point. That is, whether or not once having made the statement, does time permit you to test the accuracy of a statement made previously by the Russians?

Dr. NEWELL. Yes, it does, largely because of the breadth of our program.

Mr. YATES. What has been your experience with the validity of those statements?

Dr. NEWELL. Usually what they have published has turned out to be correct.

SUMMARY OF SCIENTIFIC SATELLITE PROGRAM FOR 1963

Mr. THOMAS. You have advanced research $17.4 million, advanced technical development $16.3 million, and $141.8 for your flight program. How many shots are you going to fire all together for this $175 million?

Dr. NEWELL. The $175 million includes programs that started before this year and will continue beyond this year. Included in it are five orbiting geophysical observatories, three orbiting astronomical observatories, four DELTA-sized orbiting solar observatories, four ATLAS-AGENA-sized orbiting solar observatories, two small ionospheric satellites, two vertical earth probes, two energetic particle satellites, two atmospheric structure satellites, several international small-sized satellites.

Mr. THOMAS. Will you detail those in the record?

Dr. NEWELL. Eleven satellites and five probes planned for 1962 launches, plus between 10 and 15 for the following year.

Mr. THOMAS. Can you give us a bird's-eye view of the payload? Put the payload for each into the record. What will be your largest and smallest payload?

Dr. NEWELL. The largest payload will be the orbiting astronomical observatory, between 3,300 and 3,500 pounds weight. This is the highly precise telescope pointing satellite. Those will be used for astronomical research in the ultraviolet region and other wavelength regions that we do not see at the surface of the earth.

The first orbiting astronomical observatory will be instrumented by the University of Wisconsin and the Smithsonian Astrophysical Observatory to make a television ultraviolet scan of the sky.

The second orbiting astronomical observatory will be instrumented by the Goddard Space Flight Center to make precision spectroscopic analyses of various stars in the ultraviolet.

Mr. THOMAS. What is the altitude of this laboratory?

Dr. NEWELL. This is for a 475-mile altitude, below the radiation belt, in a near equatorial orbit.

Mr. THOMAS. I think it would be helpful at this point in the record if you will detail those and give us the heights, the contractor, and the payload of each one. That will clarify the record for us. Give an approximate figure of the cost of each.

(The information supplied follows:)

Scientific satellites

Project	Prime contractor	Cost (in thousands)			Planned orbit			Weight (pounds)	Year (calendar year) launch
		Fiscal year 1961	Fiscal year 1962	Fiscal year 1963	Inclination	Apogee	Perigee		
					Degrees				
Orbiting geophysical observatories:									
EGO	Space Technology Laboratory	$5,358	$28,171	$58,595	31	69,000	170	900	1963
POGO	do				90	570	160	300	1964
Orbiting astronomical observatories	Grumman Aircraft Corp	7,472	32,428	45,668	32	475	475	3,300	[1]
Orbiting solar observatories:									
Model A	Ball Bros	3,917	4,247	3,819	33	300	300	440	1962
Model B	Not selected		330	11,687					1964
Topside sounders:									
THOR-AGENA	Canadian Defense				80	600	600	310	1962
	Research Telecommunications Laboratory.	4,794	11,991	852					
SCOUT	Airborne Instruments Laboratory				80	650	545	110	1962
Ionosphere monitor	Not selected			2,983	80	1,000	1,000	100	1964
Geoprobes [2]	do			4,397		4,000		100	1964
Energetic particles satellite	GSFC	3,142	2,062	336	33	47,800	180	83	1962
Atmospheric structure satellite	GSFC	3,506	1,801	558	50	372	155	375	1962
International ionosphere satellite:									
DELTA	GSFC	2,673	3,625	338	53	600	200	150	1962
SCOUT	GSFC	60	1,740	5,247	51	1,000	230	165	1963

[1] Late 1963, 1964. [2] Not satellite—measures vertical profile and returns to earth.

Lunar and Planetary Exploration

Mr. Yates. Lunar and Planetary Exploration. Put pages RDO 10–1 through 9 in the record.

(The pages referred to follow:)

Lunar and Planetary Exploration

Summary of requirements

	1961	1962	1963
Advanced research	$5,432,000	$5,584,000	$15,000,000
Advanced technical development	11,670,000	12,809,000	17,000,000
Flight program:			
Lunar programs	58,670,000	106,837,000	151,800,000
Planetary and interplanetary programs	15,247,000	44,734,000	89,760,000
Total	91,019,000	169,964,000	273,560,000

OBJECTIVES

The objectives previously stated for the lunar and planetary exploration program remain unchanged.

Modern science and technology present challenging possibilities for the unmanned exploration of the solar system. An accelerated program to exploit these possibilities is being undertaken by the NASA. In addition to its direct contributions to science, this program will provide a sound scientific and technological foundation for subsequent manned exploration. Before man lands on the moon, for example, far more must be known about the lunar surface and environment than can be determined from earth.

The scientific objectives of this program include studies of the physics of the moon and planets, solar and interplanetary physics, biosciences and extraterrestrial life, and cosmology. Nearly all of the scientific disciplines are involved in these categories. Physics of the moon and planets is comparable to geophysics of the earth, and as such includes studies of atmospheres, ionospheres, trapped radiation, magnetic and gravitational fields, and properties of the surface and subsurface. Solar and interplanetary physics is concerned with the solar atmosphere and radiations, and with the properties of interplanetary space as influenced by the sun, the solar system itself, and sources from outside the solar system. Bioscience encompasses the search for extraterrestrial life and the study of the behavior and propagation of earth life forms in extraterrestrial environments. Lastly, cosmology is the effort to integrate the results of all these studies into a better understanding of the nature and origin of the solar system, and the universe itself.

Lunar program

The scientific objective of the lunar science program is the exploration and investigation of the moon for the information which it can provide on the history of the earth-moon system, and on the origin of planetary bodies in the solar system. The experiments are directed toward the determination of surface structure and physical properties of the surface, the origin of the surface features, chemical composition, properties of the moon as a planetary body, and the thermal history of the moon.

Surface features and structure will be determined by television systems. Physical properties of the surface to be measured include electrical and thermal conductivity, and the size distribution of surface rocks and particles. The chemical composition will be studied by a variety of methods, including X-ray fluorescence spectrometry and gamma ray spectrometry. The detection of radioactive elements in the surface will be an important part of this study. Information regarding the thermal history of the moon will come from the measurement of heatflow through the surface, and from the simultaneous analysis of the chemical composition, the surface features and structure, and the degree of differentiation of the moon's interior. The primary source of information on the differentiation of the interior will be by analysis of the orbit of an advanced lunar satellite. Seismic and gravimetric measurements will be the

principal source of information regarding the properties of the moon as a planetary body. The seismic and gravimetric data may also yield information on the differentiation of the moon's interior.

In addition, the moon has a biological interest through the possible occurrence of organic molecules, precursors of living organisms, in the layer of dust which has accumulated over many eons. The chemical analysis of this surface dust layer may prove to be of immeasurable importance to the biological sciences.

Finally, the exploration of the lunar surface, and the analysis of its physical and chemical properties, are necessary steps in the planning and designing of manned instrument stations and the solution of the problems of construction and life-support for a manned lunar station.

Planetary and interplanetary program

The objective of the planetary and interplanetary science program is the extension of man's knowledge of the solar system. Investigations for signs of planetary life are among the most important currently planned. These will be undertaken by measurements in the infrared spectrum, surveying the surface for organic molecules and solvents, and by examining planetary atmospheres for carbon and oxygen compounds, such as CO and ozone, to determine if the planet environment is compatible with the support of life. Some information can be obtained from earth-based observations. Additional knowledge can be learned from balloon observations at great enough height above earth to eliminate most of the ultraviolet absorption. Still additional measurements will be required from planet fly-bys, orbiters, and ultimately from probes directly examining the planetary atmosphere and surface. In addition, measurements of planetary physics, atmospheres, magnetic fields, radiation belts, and surface features are required.

Little is known about the structure and composition of interplanetary space. Observations of this medium, the solar effects upon it, and its relationship to the terrestrial condition will be made with the long-range objective of understanding the nature of the solar system. This will be accomplished by obtaining measurements of the interplanetary plasma density and its energy spectrum and some data on the angular, spatial and temporal dependence of the flux. Detailed measurements of interplanetary plasma during periods of minimum solar activity as well as during periods of great sunspot activity will be emphasized. An important objective is the correlation of measurements between interplanetary probes, planet orbiters and lunar orbiters which should make it possible to establish the scale size of plasma clouds ejected by the sun and compare the interplanetary densities at different portions of the solar system. Also a particularly important objective is the study of cosmic dust which, as representative of the building blocks of stars and galaxies, may be a key in the study of the origin of the solar system and the universe.

JUSTIFICATION

From a scientific viewpoint, the exploration of the Moon is of great importance because its surface has not been subjected to the erosion of winds and water, and therefore may carry on the surface a record of the early history of the solar system. This record, lost forever on the Earth, Mars, or Venus, may only be available on the Moon. The Moon may also have on its surface, in the layer of dust which has accumulated there, organic molecules which may provide a better understanding of the development of physical life on the Earth.

Exploration of the planets presents a different type of attraction. They all differ markedly from the Earth. In these very differences may lie clues to the nature, origin, and evolution of the solar system. From the study of other planets it is almost certain that more will become known about the Earth. The expected discovery of organic molecules and life forms may have tremendous implications in basic chemistry and biology and in medicine. The scientific study of solar and interplanetary space will strengthen the understanding of the Sun-Earth relationships upon which man's comfort and life cycle intimately depend. Vital information will be gathered on potential hazards which await future space travelers. Included in this category are solar radiation streams, lunar and planetary terrains, and even planetary meteorological conditions. Hopefully, knowledge may be gained to permit utilization of natural resources at these distant destinations.

The lunar and planetary exploration program is designed to avoid duplication and to promote reliability in the development of spacecraft. Efforts have been made to minimize the number of types of spacecraft and to maximize the number of uses for each type. Wherever possible, the same basic subsystems, or their advanced derivatives, will be employed in successive spacecraft series. This will result in the evolutional development of a family of unmanned exploration spacecraft, wherein the relatively simple systems and limited capabilities of early spacecraft will be extended and refined as launch vehicle weight-lifting capability is increased to the point where later spacecraft will be capable of the more sophisticated operations necessary to achieve the objectives. This building-block concept will permit exploitation of early unmanned scientific and technological missions as part of an orderly flight-qualification sequence prior to undertaking manned exploration activities.

The proposed schedule under the lunar and planetary exploration program follows:

Lunar projects	Mission objectives	Launch vehicle	Calendar year of first launch
Ranger	Rough landing; high resolution TV reconnaissance of the lunar surface.	ATLAS-AGENA	1961
Surveyor lander	Soft landing	ATLAS-CENTAUR	1963
Surveyor orbiter	Precise orbit	do	1965
Prospector	Soft landing-mobile	SATURN	1965
Planetary projects:			
Mariner R	Fly-by	ATLAS-AGENA	1962
Mariner B	do	ATLAS-CENTAUR	1964
Voyager	Orbit and land	SATURN	1965
Interplanetary projects:			
Pioneer 5	Radiation spectrum and fields	THOR-ABLE	1960
Magnetometer probe	Plasma and fields	THOR-DELTA	1961
Ranger, Mariner, Voyager test vehicles.	Spacecraft test plus interplanetary physics.	Various	1961

Advanced technical development

	1961	1962	1963
Lunar advanced technical development:			
Feasibility, design, and reliability studies and services	$596,000	$1,218,000	$1,050,000
Data processing systems	70,000	107,000	295,000
Guidance and control systems	964,000	818,000	1,030,000
Communications and electronics systems	329,000	270,000	1,300,000
Lunar surface analysis instrumentation	1,170,000	1,432,000	1,695,000
Development of radiometers and spectrometers	375,000	562,000	625,000
Materials and structures development	478,000	356,000	555,000
Documentation support	115,000	39,000	30,000
Subtotal	4,097,000	4,802,000	6,580,000
Planetary and interplanetary advanced technical development:			
Feasibility, design, and reliability studies	991,000	673,000	885,000
Guidance and control systems	294,000	912,000	1,405,000
Communications and electronics systems	298,000	819,000	1,047,000
Planetary surface analysis instrumentation	175,000	600,000	1,190,000
Planetary atmospheric instrumentation	250,000	279,000	438,000
Bioscience instrumentation	321,000	950,000	1,000,000
Interplanetary probe instrumentation	347,000	318,000	400,000
Materials and structures development		309,000	1,000,000
Documentation support		29,000	35,000
Propulsion systems development	4,897,000	3,118,000	3,020,000
Subtotal	7,573,000	8,007,000	10,420,000
Total, advanced technical development	11,670,000	12,809,000	17,000,000

Advanced technical development

Advanced technical development provides the connecting link between advanced research and future flight programs by taking the discoveries in the advanced research program and translating them into devices with engineering feasibility and program utility.

Fiscal year 1962 funds support the development of scientific payloads to be flown on available launch vehicles. The fiscal year 1963 request reflects planned preparation for the best possible use of later generation boosters with larger weight-carrying capability. Scientific instruments of increased sophistication and means to perform complicated midcourse and terminal spacecraft maneuvers are required. Of immediate concern are the complex guidance, control, observation, and communications systems needed when data is to be collected and telemetered after contact with the lunar surface on RANGER and SURVEYOR missions, and the Martian surface on the 1964 Mariner missions.

Advanced technical development for chemical and physical exploration of the moon and planets by SURVEYORS and VOYAGERS is to be accelerated with fiscal year 1963 funding in response to the developing needs of the manned lunar program. Developmental requirements include instruments which will provide continual monitoring of the environment on a self-operating basis, and equipment which will make surface travel and point-to-point communication possible.

The MARINERS, SURVEYORS, and subsequent orbiting and soft landing spacecraft, such as VOYAGER, will demand a high degree of component and system reliability over extended periods. Much of the increase in advanced technical development funds requested for fiscal year 1963 is to support a greater effort on reliability programs.

Fiscal year 1963 funds are also requested to continue spacecraft propulsion effort at the Jet Propulsion Laboratory. The problems of spacecraft maneuvering require the use of various propulsion systems. Midcourse and terminal corrections to the flight path are made by sensitive controllable thrust elements. Retrorocket systems are needed to cancel or reduce the impact velocity of a landing package. The results of this propulsion system development effort will have across-the-board application.

Flight program summary

	1961	1962	1963
Lunar program:			
ATLAS-ABLE	$5,975,000		
RANGER	45,066,000	$64,000,000	$44,022,000
SURVEYOR	7,054,000	41,037,000	97,378,000
PROSPECTOR	575,000	1,800,000	10,400,000
Total, lunar-flight programs	58,670,000	106,837,000	151,800,000
Planetary and interplanetary flight program:			
Magnometer probe	462,000		
MARINER A	13,068,000	7,620,000	
MARINER R		23,778,000	9,240,000
MARINER B	1,717,000	12,958,000	73,720,000
VOYAGER		378,000	6,800,000
Total, planetary and interplanetary flight programs	15,247,000	44,734,000	89,760,000
Lunar program: ATLAS-ABLE	5,975,000		
RANGER:			
Project management and support	768,000	1,153,000	913,000
Systems analysis and integration	2,024,000	1,712,000	1,614,000
Structural design and development	2,508,000	1,798,000	995,000
AMR facilities and administration	374,000	470,000	540,000
Lunar capsule	1,467,000	3,503,000	1,200,000
Documentation and reports	633,000	455,000	450,000
Impact TV systems	1,138,000	8,001,000	5,780,000
Data reduction and processing	1,707,000	1,299,000	1,040,000
Operations	470,000	523,000	525,000
Scientific experiments	2,284,000	2,053,000	1,209,000
Environmental requirements and testing	1,237,000	527,000	425,000
Experiment analysis	317,000	840,000	1,125,000
Communications and telemetry	4,363,000	3,232,000	2,126,000
Guidance and control	5,249,000	3,312,000	2,135,000
Power systems and energy control	2,141,000	1,391,000	400,000
Pyrotechnics design and development	221,000	260,000	195,000
Instrumentation systems	236,000	757,000	625,000
Computer support	1,259,000	2,074,000	1,825,000
Subtotal	28,396,000	33,360,000	23,122,000
ATLAS-AGENA launch vehicles	16,670,000	30,640,000	20,900,000
Total, RANGER	45,066,000	64,000,000	44,022,000
SURVEYOR:			
Project management and support		363,000	965,000
Systems analysis and integration	715,000	209,000	480,000
Structural design and development	35,000	158,000	225,000
Spacecraft development contract	4,871,000	23,150,000	29,100,000
Orbiter spacecraft development contract		7,050,000	18,050,000
Planning and documentation support	76,000	136,000	275,000
Data reduction and processing		1,849,000	8,450,000
Scientific experiments	759,000	6,840,000	10,110,000
Environmental requirements and testing		49,000	350,000
Scientific experiment analysis	454,000	329,000	570,000
Communications and telemetry	88,000	124,000	150,000
Guidance and control	56,000	206,000	280,000
Alternate mission package			5,100,000
Orbiter surveillance subsystem			5,478,000
Computer support		37,000	495,000
Subtotal	7,054,000	40,500,000	80,078,000
CENTAUR launch vehicles		537,000	17,300,000
Total, SURVEYOR	7,054,000	41,037,000	97,378,000
PROSPECTOR:			
Project management and support			885,000
Systems analysis and integration	575,000	1,800,000	2,565,000
Spacecraft development contract			6,800,000
Experiment analysis			150,000
Total, PROSPECTOR	575,000	1,800,000	10,400,000
Total, lunar flight program	58,670,000	106,837,000	151,800,000

SUMMARY OF LUNAR AND PLANETARY EXPLORATION

Mr. YATES. This increased from $91 million in 1961 to $273,560,000 in 1963. May we have an explanation of this program?

Dr. NEWELL. This lunar and planetary program is approaching the period when we will be having our major firings. In the past the primary firings have been the PIONEER launchings, the small PIONEER probes, including PIONEER V, and the EXPLORER X which I described to you yesterday.

We have had two test launches of a RANGER and one try at a lunar impact RANGER. Our major flight program is ahead of us.

The costs here are for that major flight program, for the development and use of the RANGERS, the SURVEYORS, which will be soft lunar landers; for the MARINERS, which are planetary spacecraft; and for studies of the use of SATURN-sized PROSPECTORS for lunar work. This will be closely involved in the manned flight program. Also there will be studies of the use of SATURN-sized VOYAGERS for planetary work.

CONTRACTORS FOR LUNAR AND PLANETARY EXPLORATION

Mr. YATES. Who will be the contractors under this program?

Dr. NEWELL. In the case of the SURVEYOR, soft lander, the prime contractor is Hughes Aircraft, under the monitorship of the Jet Propulsion Laboratory.

In the case of the RANGER, the Jet Propulsion Laboratory has done most of this work.

In the case of the MARINER, the Jet Propulsion Laboratory has done this work.

Both PROSPECTOR and VOYAGER are study items at this time and there is no contractor.

Mr. THOMAS. Your entire cost is broken down on pages 6, 7, 8, and 9. Are you charging any spacecraft or powerplants against this program?

Dr. NEWELL. This program has charged against it the RANGER, SURVEYOR, and MARINER spacecraft, and the launch vehicles required to launch them.

Mr. THOMAS. The ATLAS-ABLE, you are not funding anything on that program. It is the RANGER, SURVEYOR, and MARINER. Have these all been developed?

Dr. NEWELL. There is one exception. In the case of the CENTAUR, the early flights will be on development vehicles which are currently charged to CENTAUR.

Dr. DRYDEN. ATLAS-AGENA on page 10–8, $20,900,000 for RANGER, and the SURVEYOR has $17,300,000 for CENTAUR in it.

Mr. THOMAS. This is all instrumentation, is it not?

Dr. DRYDEN. Not the ATLAS-AGENA launch vehicle.

Mr. THOMAS. The vehicle itself is $20.9 million?

Dr. DRYDEN. Yes, sir.

Mr. YATES. What will be the orbit of these vehicles?

Dr. NEWELL. RANGERS are to follow an impact trajectory to the moon. A capsule will be ejected from the RANGER in order to land a seismograph on the moon in operating condition. The main bulk of the RANGER, upon impact, will be destroyed.

RESULTS OF RANGER MOON SHOT

Mr. YATES. The calendar year for the first launch was 1961?

Dr. NEWELL. Yes, the first two were launched in 1961, and the first attempt at a lunar impact was made early this year.

Mr. THOMAS. What was the payload?

Dr. NEWELL. On the RANGER bus, there was television equipment, equipment to measure radioactivity of the moon on approach, a radar experiment. In the capsule, which was to survive, was a seismometer to look for seismic activity on the moon and the results of impact of large meteors.

Mr. YATES. That was the flight that did not get to the moon?

Dr. NEWELL. That is right.

Mr. YATES. Was there anything that was learned from that flight even though it did not get to the moon?

Dr. NEWELL. We got very little scientific data out of the flight because this was directed at the moon, and since the RANGER did not get in position to study the moon, the instruments could not come into play.

Dr. DRYDEN. There were some technological results from the performance of the mechanisms. This was a case of guidance failure so that the fuel was not cut off, so the engine ran to exhaust the fuel, which gave it a high speed and it got to the moon's orbit before the moon got there.

TOTAL COST OF LUNAR AND PLANETARY EXPLORATION

Mr. THOMAS. Is this going to be the final cost before you try to get some of your astronauts this high up? You have a follow-on program for 1964 and 1965?

Dr. NEWELL. Our estimate of the complete RANGER program planned right now, which involves nine RANGERS, including those that have already been launched, is about $170 million.

Mr. THOMAS. But RANGER does not occupy all of this $273 million for 1963 by any means.

Dr. NEWELL. No, sir. The estimate for the SURVEYOR program, which includes 12 SURVEYORS, 7 landers plus 5——

Mr. THOMAS. That is $97 million.

Dr. NEWELL. Five orbiters, the total projected cost we foresee is about $320 million.

Mr. THOMAS. In addition to this $273 million?

Dr. NEWELL. Including that.

Mr. THOMAS. You are going to pursue this program rather diligently for the next 2 years before you try to get a man to the moon?

Dr. NEWELL. Yes, sir.

Mr. THOMAS. How much additional are you going to have to have besides this $273 million?

Dr. NEWELL. I am picking out the items one at a time. If you look at the SURVEYOR, this is page RDO 10–9——

Mr. THOMAS. $97 million?

Dr. NEWELL. $97 million this year, plus some spent in a previous year. The total for SURVEYOR, as we project it, will be $320 million.

Mr. THOMAS. What is the other part of the program to cost?

Dr. NEWELL. If you look back at RANGER, where we had $44 million, on page RDO 10–8, our projected total would be $170 million. That, of course, includes the figure shown here.

Dr. DRYDEN. About $20 million more than shown here.

Mr. THOMAS. How much in addition will you have to have in the next 2 years over your $273.5 million shown here? What is a good horseback opinion?

Dr. NEWELL. I would say a horseback estimate is that the lunar and planetary program will about double next year. When we begin to use the SATURN-size spacecraft, like VOYAGER, additional increases will occur.

Mr. THOMAS. You think this will do it?

Dr. NEWELL. For the unmanned.

Mr. THOMAS. Yes. You have a big item on PROSPECTOR.

Dr. NEWELL. That is $10 million.

Mr. THOMAS. That will not take care of PROSPECTOR altogether, will it, this $10.4 million?

Dr. NEWELL. No, but PROSPECTOR development we expect to be picked up in the manned area.

Mr. THOMAS. You are reasonably certain you can keep this figure around $275 million?

Dr. NEWELL. If we get into a VOYAGER program, that is another program entirely, and costs must go up. We are studying what ought to be done there.

NATURE AND OPERATION OF VOYAGER PROGRAM

Mr. THOMAS. What is the VOYAGER program and how will it differ from this?

Dr. NEWELL. The VOYAGER is the SATURN-sized spacecraft for planetary studies.

Mr. THOMAS. What is going to be the difference, a difference in payload?

Dr. NEWELL. A considerably larger payload. The VOYAGER will give us capability to go to the planets with a package that we can either orbit around the planet or land on the planet or perhaps do both, leave a portion in orbit and then land.

Mr. THOMAS. What will that payload weigh?

Mr. CORTRIGHT. The payload launched by a SATURN C–5 would weigh in the neighborhood of 60,000 pounds.

Mr. THOMAS. Thirty tons?

Mr. CORTRIGHT. Some of that would be required for retropropulsion.

Mr. THOMAS. I mean your instrumentation payload.

Mr. CORTRIGHT. We do not have the breakdown between structure, propulsion, and instrumentation.

Mr. THOMAS. Do you have an opinion that you can straighten out later?

Mr. CORTRIGHT. It could run as much as a third of that.
Mr. THOMAS. What was the payload the Russians sent up?
Mr. DRYDEN. 700 pounds to Venus.
Mr. THOMAS. This will be 8 or 10 times as big.
Dr. WEBB. Or bigger.
Mr. RHODES. The VOYAGER does not return to earth.
Mr. CORTRIGHT. No.

EXPECTED RESULTS FROM LUNAR EXPLORATION

Mr. THOMAS. What part of your problem will you solve with this if it is successful according to schedule? Where will you be then as far as information necessary before you put up your astronaut?
Dr. NEWELL. In the case of the lunar landing?
Mr. THOMAS. Yes.
Dr. NEWELL. With our soft landers and the orbiter combined, we will be able first to get a very detailed survey of the spots on which we land. This survey will include television pictures with the resolution of two-tenths of a meter or so, plus a measurement of the physical structure of the surface including measurements into the surface by means of drills. With the orbiter, we will be able to extend the spot measurements with television equipment.
Mr. THOMAS. Are you going to get enough information to be satisfied that you can get by Dr. Van Allen's first radiation band, but what about the next big one?
Dr. NEWELL. We will, in a combination of these lunar flights and eccentric orbiting earth satellites, get as much data as we can on the radiation in space. With this, we hope to give——
Mr. THOMAS. What is the altitude of the one you think is quite dangerous, that big radiation band?
Dr. NEWELL. The very dangerous radiation I mentioned yesterday is the solar proton beam that the sun ejects at the time of solar flare. This comes from the sun through interplanetary space at the rate of 1,000 to several thousand miles per second.
Mr. THOMAS. Is it a band? Does it congregate in a band that is constant?
Dr. NEWELL. It is not constant. The radiation is ejected from the sun at the time that the sun is active, and that is more or less haphazard.
Mr. THOMAS. Does it dissipate itself and not form a band?
Dr. NEWELL. It does not do that. It sweeps through the interplanetary system much like the streaming of water from a hose, some of it gets caught by our radiation belt, some of it goes on by the earth and is lost. Some of it is reflected by magnetic field discontinuities in interplanetary space, and it bounces around in interplanetary space a number of times.
Dr. DRYDEN. Like a big cloud of buckshot. You want to stay out of it if you can.
Dr. NEWELL. The real problem in this connection, one of them, is we cannot predict when the sun is going to spew forth these beams. If we could, we might simply undertake to schedule firings when they were not going to happen.

Mr. THOMAS. Doctor, we can readily appreciate your work here. This is certainly important to you in the attempt to get a human up and to get him back alive, is it not?

Dr. NEWELL. It certainly is.

Mr. THOMAS. Are you on schedule here?

Dr. NEWELL. We have a satellite instrumented for just this purpose.

Mr. THOMAS. How firm are these figures of $273.5 million?

Dr. NEWELL. We feel that this figure will support the program detailed in the budget book.

Mr. THOMAS. Thank you, gentlemen. Let us come back in the morning at 10 o'clock.

WEDNESDAY, APRIL 18, 1962.

Mr. THOMAS. Will the committee please come to order.

SCOUT PROGRAM

Let us look at the SCOUT program. Mr. Reporter, put in the record pages RDO 11–1 and 2. Let us combine the tables on 1, 2, 3 and 4 without too much of the reading matter.

(The material referred to follows:)

SCOUT

Summary of requirements

	1961	1962	1963
Vehicle development	$4,550,000	$3,263,000	$3,297,000
Motor development	1,250,000	2,600,000	4,000,000
System support	3,852,000	2,343,000	1,650,000
Total	9,652,000	8,206,000	8,947,000

OBJECTIVES

The purpose of the SCOUT program is to develop a reliable, relatively inexpensive vehicle for general space research. The vehicle's capabilities include orbital, probe, and reentry missions. It is the smallest of the basic NASA family of launch vehicles and will fulfill a large variety of requirements for small-sized payloads. Operational SCOUT vehicles are funded under the various flight programs using SCOUT.

JUSTIFICATION

The SCOUT vehicle development flight test program comprises a total of eight vehicles. Of the seven launchings to date, four have been successful and three unsuccessful. SCOUT No. 4, launched in February 1961, was the first all-solid propelled vehicle to place a satellite in orbit. The remaining development vehicle will be launched in early 1962.

In late 1960, a prime vehicle contractor was established for the second four development vehicles and the subsequent operational vehicles.

The SCOUT vehicle, in its present configuration, is capable of placing a 150-pound payload with a maximum diameter of 25 inches into a 300-nautical-mile orbit. Both NASA and DOD missions require that this capability be increased to approximately 250 pounds and a maximum diameter of 32 inches. By increasing the performance of the basic vehicle to meet the requirements of both agencies a standard vehicle can be achieved with a resulting economy of production and simplicity of logistics. The SCOUT development program is oriented in this direction.

All operational vehicles will be built to the same specifications and on a single production line. Only three will be specially modified to meet a unique mission requirement. Further, the logistic support of the three launch sites (Atlantic Missile Range, Pacific Missile Range, and Wallops Island) has been thoroughly integrated into a single program.

The fiscal year 1961 funding completed procurement of the eight development vehicles and initiated a motor improvement program to obtain the performance required of the SCOUT vehicle. Further improvement of performance, standardization of the basic design, completion of component qualification and design of the larger diameter payload compartment is being accomplished under 1962 funding. Completion of the motor improvement program and qualification of the entire vehicle to the operational standards required will be accomplished in 1963. In addition, the accuracy of the vehicle will be increased to meet the requirements of a number of missions for near-circular orbits or orbits at exact inclinations. These improvements will be validated by static test and other means without procurement of development vehicles in addition to the eight development vehicles now provided.

Funding requirements

Vehicle development

	1961	1962	1963
Vehicle	$1,900,000	$1,850,000	$1,847,000
Guidance and control	2,650,000	1,413,000	1,450,000
Total, vehicle development	4,550,000	3,263,000	3,297,000

Motor development

	1961	1962	1963
Motor procurement	$140,000		
Motor development	1,110,000	$2,600,000	$4,000,000
Total, motor development	1,250,000	2,600,000	4,000,000

System support

	1961	1962	1963
Ground support equipment	$1,425,000	$793,000	$550,000
Launch services	1,800,000	1,100,000	
Engineering coordination	627,000	450,000	1,110,000
Total, system support	3,852,000	2,343,000	1,650,000

SUMMARY OF SCOUT PROGRAM

Mr. THOMAS. You are getting into your smaller vehicles now. In 1961 you have $9,652,000; in 1962, $8,206,000; and 1963, $8,947,000.

Operational vehicles are funded against the various programs using SCOUT.

Dr. NEWELL. The SCOUT vehicle development is virtually completed. The funding shown here should complete the development.

Mr. THOMAS. How much do you have tied up in it?

Dr. NEWELL. This was an eight-vehicle development.

Mr. THOMAS. How much money is it going to cost? Is this $9 million going to wrap it up?

Dr. NEWELL. This will wrap up the development.

Mr. THOMAS. How much money do you have tied up in it?
Dr. NEWELL. $27 million.

CONTRACTOR FOR SCOUT

Mr. THOMAS. Who is the contractor?
Dr. NEWELL. Chance-Vought, under the direction of the Langley Research Center.
Mr. THOMAS. Where is Chance-Vought located?
Dr. NEWELL. In Texas.
Mr. THOMAS. What is the thrust of the rocket?
Mr. CORTRIGHT. A better way to express the ultimate performance is 250 pounds payload at 300 miles altitude orbit.
Dr. DRYDEN. The thrust is 103,000 pounds is the answer.
Mr. THOMAS. It is one of the small ones but will be a workhorse.
Dr. NEWELL. This will be a workhorse vehicle. At the present time it is the world's only all-solid propellant satellite launching vehicle and it is estimated to cost $1 million per vehicle.

DELTA PROGRAM

Mr. THOMAS. Let us take a look at DELTA. Put in the record RDO 12–1 and 12–2.
(The pages referred to follow:)

DELTA

Summary of requirements

	1961	1962	1963
Vehicle development	$3,500,000	$760,000	$268,000
Engine development	105,000	51,000	
System support	6,874,000	2,116,000	
Total	10,479,000	2,927,000	268,000

OBJECTIVES

To provide a reliable launch vehicle for medium-payload satellites and small-payload space probes.

JUSTIFICATION

The DELTA vehicle is being used to launch a variety of scientific and applications satellites and space probes. The DELTA is a three-stage vehicle with the first stage being a production THOR missile with the nose cone and the guidance unit removed. The second stage is similar to that of THOR-ABLE and VANGUARD with a new engine thrust chamber and an improved radio inertial guidance system. The third stage is a solid propellant rocket motor developed for VANGUARD.

Although similar in design to the THOR-ABLE series, the DELTA incorporates a number of changes, including a coast-phase attitude control system that will permit higher injection altitudes and additional flexibility in establishing trajectories. The capabilities of this vehicle were demonstrated on August 12, 1960, when the second DELTA vehicle successfully placed the ECHO satellite in a precise, nearly circular orbit, at an altitude of about 1,000 miles; and again on November 23, 1960, when the third DELTA placed into orbit the TIROS II meteorological satellite at an altitude of approximately 400 miles. Of the six DELTA launches to date, five have been successful and one (DELTA No. 1) was unsuccessful. DELTA has a payload capability of up to 500 pounds for satellite applications and up to 75 pounds for space probes.

FUNDING REQUIREMENTS

Vehicle development

	1961	1962	1963
Design and engineering	$1,075,000	$305,000	$268,000
Fabrication	2,425,000	455,000	
Total, vehicle development	3,500,000	760,000	268,000

During fiscal year 1961, the basic soundness of the DELTA design was firmly established through the successful firing of DELTAS 2 and 3. Fabrication of the 12 development vehicles will be completed with fiscal year 1961 and 1962 funds. A small amount of fiscal year 1963 funds will be required to complete final review and analysis of the development program.

Engine development

	1961	1962	1963
Changes to 3d-stage motors	$105,000	$51,000	
Total, engine development	105,000	51,000	

Changes in the third stage solid propellant motor originally developed for VANGUARD were relatively minor and consisted principally of applying closer control over dimensions and performance characteristics. Fiscal year 1962 changes included work on delayed ignition and the replacement of an overage motor.

System support

	1961	1962	1963
Guidance services	$555,000	$910,000	
Range support services	658,000	75,000	
Contractor launch services	5,661,000	1,131,000	
Total, system support	6,874,000	2,116,000	

Guidance services are procured through the Air Force and cover utilization of the radio guidance systems during each of the DELTA launches. Range support services include such items as the purchase of propellants, range overtime compensation, provision of telemetry support services, and direct work orders issued to the Atlantic Missile Range. Funding for contractor launch services in fiscal year 1962 covers the reception assembly, check out, and launch of the vehicles, and required guidance services. The requested funding will complete all requirements for the 12-vehicle DELTA program. The last development vehicle launch is planned for midcalendar year 1962.

SUMMARY OF DELTA PROGRAM

Mr. THOMAS. Describe the DELTA program.

Dr. NEWELL. DELTA is a THOR-based vehicle using the ABLE-type upper stages with an advanced guidance system. It is capable of putting a 400- or 500-pound spacecraft in 300-nautical-mile orbit.

Mr. THOMAS. How much is the DELTA?

Dr. NEWELL. Approximately $37.6 million of research and development funds.

Mr. THOMAS. Will this wrap it up, this $2.9 million?

Dr. NEWELL. It is $268,000 in 1963. That will wrap up the development.

Mr. THOMAS. How many did you get?
Dr. NEWELL. That covered 12 vehicles.

CONTRATOR FOR DELTA

Mr. THOMAS. Who is your contractor here?
Dr. NEWELL. Douglas is the prime contractor.
Mr. THOMAS. Where is Douglas located?
Dr. NEWELLL. That is in California.
Dr. DRYDEN. The $268,000 is a launch cost of the tail end of those vehicles.
Dr. SILVERSTEIN. That vehicle has flown eight times with seven successes. It has the best record of any of our launch vehicles.
Mr. THOMAS. This will be one of your work horses, too, will it not?
Dr. SILVERSTEIN. Yes.

DIFFERENCE BETWEEN AND NEED FOR SCOUT AND DELTA

Mr. JONAS. As briefly as you can, tell us why you need SCOUT and DELTA, too.
Dr. NEWELL. The SCOUT launching vehicle is capable of landing payloads up to 200——
Mr. JONAS. I understand that, but you have one capable of doing better than that and it is DELTA. Why do you need SCOUT?
Dr. NEWELL. DELTA costs $2.5 million per flight. SCOUT costs $1 million per flight. If you project out the cost of using SCOUT as we see it in the future, you can make a considerable saving in using SCOUT.
Mr. JONAS. Why do you need DELTA, then?
Dr. NEWELL. DELTA can do things SCOUT cannot do. DELTA, for example, can project a payload to escape.
Mr. JONAS. DELTA can do everything SCOUT can. Therefore, why do you need both?
Dr. DRYDEN. The simplest analogy I can think of is the use of a panel truck and a one-ton truck. You can do with a panel truck much more cheaply a lot of things you can do with a one-ton truck.
Mr. JONAS. What do you expect to show from SCOUT that you won't show from DELTA?
Dr. DRYDEN. SCOUT will do the individual scientific experiments which are accommodated within a payload of 250 pounds. We are using this vehicle primarily in cooperation with other nations, for example, because of the small cost. It would be very expensive to have to use the larger vehicle for smaller payloads.
Mr. THOMAS. What was the wrap-up cost on SCOUT and DELTA, those 8 and 10?
Dr. NEWELL. The total investment in the development of SCOUT was 27.4 million for eight vehicles.
Mr. JONAS. How about DELTA?
Dr. NEWELL. $37.6 million for 12 vehicles.
Mr. THOMAS. What will be the unit cost when you get into production?
Dr. NEWELL. The unit cost of SCOUT will be $1 million launched and the unit cost of DELTA, $2.5 million.

SUMMARY OF NASA LAUNCH VEHICLES

Mr. THOMAS. We will put a table entitled "Summary Chart of Launch Vehicles Used by the National Aeronautics and Space Administration" in the record at this point.

(The table follows:)

Summary chart of launch vehicles used by the National Aeronautics and Space Administration

Vehicle	Stages	Propellant	1st stage thrust in thousands of pounds	Payload (pounds)	
				300 NM orbit	Escape
SCOUT	4	Solid	103,000	150	
DELTA	3	Liquid and solid.	150,000	500	60
THOR-AGENA B	2	Liquid	165,000	1,600	
ATLAS-AGENA B	2	do	367,000	5,000	750
CENTAUR	2	do	367,000	8,500	2,300
SATURN C-1	2	do	1,500,000	20,000	
ADVANCED SATURN	3	do	7,500,000	200,000	80,000
NOVA	3	do	12,000,000	350,000	150,000

CENTAUR DEVELOPMENT PROGRAM

Mr. THOMAS. Let's take a look at CENTAUR, which is on page RDO 13–1. You have a supplemental here of 9 million. In 1961 you had $64,673,000. In 1962 you have $65,840,000 plus the $9 million supplemental, and in 1963 you are requesting $66,664,000.

The purpose of the CENTAUR development program is to develop a launch vehicle of high performance and reliability for NASA unmanned lunar and planetary exploration.

Mr. Reporter, put 13–1, 13–2, and tables on 13–3 and 13–4 in the record.

(The material referred to follows:)

CENTAUR

Summary of requirements

	1961	1962	1962 supplemental	1963
Vehicle development	$37,373,000	$42,900,000	$9,000,000	$46,960,000
Engine development	23,960,000	19,936,000		11,140,000
System support	3,340,000	3,004,000		8,564,000
Total	64,673,000	65,840,000	9,000,000	66,664,000

OBJECTIVES

The purpose of the CENTAUR development program is to develop a launch vehicle of high performance and reliability for NASA unmanned lunar and planetary exploration missions and DOD missions using communications satellites in a high earth orbit. The costs of CENTAUR operational vehicles are funded under the various programs using the CENTAUR vehicle.

JUSTIFICATION

CENTAUR is a high energy upper stage using liquid hydrogen and liquid oxygen. The lower stage is an ATLAS vehicle with a cylindrical top section for mounting the upper stage.

Ten developmental CENTAURS are planned for flights in the 1962–64 period. Some of the development flights will carry test payloads and an operational vehicle is expected for 1964 NASA and DOD missions.

CENTAUR occupies a position of key significance in the NASA space program. It is planned for launching unmanned reconnaissance spacecraft into orbit about the moon and unmanned spacecraft for lunar landings to gather vital information about the moon and its environs needed for manned lunar landing. It is also planned for unmanned flights to Mars and Venus. It will carry a DOD communications satellite into a high earth orbit which keeps the satellite stationary with respect to a position on earth. It will provide this country with our first experience and technology in using liquid hydrogen in flight. The successful use of liquid hydrogen in flight is highly important to our national space program. The upper stages of SATURN will use liquid hydrogen, as will future nuclear propulsion systems.

FUNDING REQUIREMENTS

Vehicle development

	1961	1962	1962 supplemental	1963
Second-stage design engineering	$9,108,000	$10,323,000	$4,319,000	$7,600,000
First-stage procurement and modification	4,500,000	3,950,000	----------	7,400,000
Fabrication of second-stage test vehicles	14,874,000	15,506,000	825,000	13,860,000
Ground testing	8,891,000	7,452,000	3,856,000	7,400,000
Launch support	----------	5,669,000	----------	10,700,000
Total, vehicle development	37,373,000	42,900,000	9,000,000	46,960,000

Engine development

	1961	1962	1963
Engine design and engineering	$5,662,000	$4,035,000	$2,940,000
Fabrication of prototype and production engines	7,946,000	8,401,000	6,000,000
Ground testing	10,352,000	7,500,000	2,200,000
Total, engine development	23,960,000	19,936,000	11,140,000

System support

	1961	1962	1963
NASA support	$2,180,000	$600,000	$1,388,000
Air Force support	----------	1,250,000	900,000
Marshall Space Flight Center, support	1,160,000	654,000	2,276,000
Propellants	----------	500,000	4,000,000
Total, system support	3,340,000	3,004,000	8,564,000

SUMMARY OF CENTAUR PROGRAM

Mr. THOMAS. The table on 13–4 shows you have a cost here of about $8.5 million in ground testing systems support. Give us the history on the CENTAUR.

Dr. NEWELL. I would like Mr. Cortright to speak to this.

Mr. CORTRIGHT. The CENTAUR program started in 1958 under the auspices of ARPA in the Department of Defense. It was transferred to NASA shortly after that. In about July 1960 it was defined as a

six-vehicle program to develop a rocket system using liquid hydrogen and liquid oxygen, which is a new propellant combination.

Mr. THOMAS. This is an upper-stage rocket. What is its thrust?

Mr. CORTRIGHT. 30,000 pounds. It uses two 15,000-pound engines developed by Pratt & Whitney in West Palm Beach, Fla.

TOTAL COST OF CENTAUR

Mr. THOMAS. What is the total amount you have tied up, including your $66.6 million for fiscal year 1963?

Mr. CORTRIGHT. In the CENTAUR project?

Mr. THOMAS. Yes.

Mr. CORTRIGHT. We estimate $340 million for the completion of the 10-vehicle test series.

Mr. THOMAS. Will this $66.6 million wrap it up now?

Mr. CORTRIGHT. No, sir; it won't.

Mr. THOMAS. How much more will it take? What period of time?

Mr. CORTRIGHT. There will be an additional $90 million or so required to complete the development program.

Mr. THOMAS. Your justification in the supplemental for this $9 million indicated a little slowdown in the program, that everything wasn't going well. What is wrong?

Mr. CORTRIGHT. We have had a number of difficulties, some of which have been overcome and others have not. You will recall the explosions which occurred at West Palm Beach due to engine-starting problems. These have now been solved but they did result in a delay to the program.

The most recent problem we are involved with is a heat flux problem between liquid hydrogen and liquid oxygen and it is related to the technique of fabricating a very thin insulating bulkhead.

IMPORTANCE OF CENTAUR PROGRAM

Mr. THOMAS. Is this your first engine where you are using these exotic fuels, liquid hydrogen and liquid oxygen?

Dr. NEWELL. Yes, sir; it is.

Dr. DRYDEN. And this is the vehicle, not just the engine.

Mr. THOMAS. How vital is this vehicle to the program?

Mr. CORTRIGHT. It is extremely vital. First, it gives us our first experience with the liquid oxygen, liquid hydrogen technology on which the entire SATURN program and the man-to-the-moon program depend.

CONTRACTOR FOR CENTAUR

Mr. THOMAS. Who is developing it?

Dr. DRYDEN. It is being developed by General Dynamics Astronautics.

Mr. THOMAS. Where are they located?

Dr. DRYDEN. In San Diego.

Mr. THOMAS. What is your total cost now in your vehicle developments? What did you say the total cost was up to date? It looks to me like you have around $350 or $360 million starting back in 1958. You use a figure of $360 million.

Mr. CORTRIGHT. We used a figure of $340 million to completion and approximately $250 million through fiscal year 1962.

Mr. THOMAS. You are going to have to have $46 million or so next year?

Mr. CORTRIGHT. Yes, sir.

Mr. THOMAS. How do you break it down between your engine and your vehicle?

Mr. CORTRIGHT. I do not have that breakdown with me.

Mr. THOMAS. Do you have an opinion, anybody? Dr. Dryden?

Dr. DRYDEN. The engine development figure should be quite small in fiscal year 1964.

Mr. CORTRIGHT. It will be.

Mr. THOMAS. You mean in the total? The way it is running—will you say it is about 40–60?

Dr. SEAMANS. Only a third. Incidentally, the very same engine is used in the SATURN C–1 second stage.

SPACECRAFT TERMINOLOGY

Mr. THOMAS. Let us take a look at spacecraft technology.

Mr. Reporter, put pages DOD 14–1 and 14–2 and the table on 14–10 in the record.

(The pages referred to follow:)

SPACECRAFT TECHNOLOGY

Summary of requirements

	1961	1962	1963
Advanced research and technology	$25,376,000	$25,220,000	$30,894,000
Flight programs	1,750,000	11,925,000	23,190,000
Total	27,126,000	37,145,000	54,084,000

OBJECTIVES

The objectives of the spacecraft technology program are to obtain the research information and technical design data required to advance the state-of-the-art, and to provide a rational technological basis for the design of increasingly sophisticated spacecraft having improved performance, reliability, and safety.

JUSTIFICATION

A balanced program of research and testing in ground facilities and of carefully selected flight tests must be pursued in a number of areas to provide the basis for advanced spacecraft design for unmanned and manned flight to the moon and planets, and for other space missions. As successful as a number of space missions have been, many of the systems and flight techniques employed in these early spacecraft are rudimentary when compared to those that will be required.

Advanced mission requirements are characterized by long flight durations and consequent long-duration exposure to the environment of space, which poses special difficulties with respect to reliable spacecraft performance and hazards to manned flight. The ever-increasing flight speeds required for interplanetary missions and the implications of such speeds with respect to atmospheric entry, the continuous demand for greater precision of navigation and flight control, and the demands for better materials and more efficient structures, require expanding research programs to provide the required solutions.

Inherent in the study and solution of these problems is the continued development of the laboratory tools required for experimental investigations. While ground-based facilities will be utilized to the maximum extent, some of the research programs require space flight experiments because combined space environment and effects cannot be properly duplicated in the laboratory.

FUNDING REQUIREMENTS

Advanced research and technology

	1961	1962	1963
Spacecraft materials and structures:			
Physics and chemistry of solids	$650,000	$500,000	$540,000
Metallurgy	1,125,000	980,000	1,030,000
High-temperature structures and heat protection stysems	2,450,000	2,500,000	2,500,000
Erectable space structures	400,000	545,000	610,000
Space hazard protection	750,000	740,000	910,000
Advanced structural design and fabrication	655,000	545,000	610,000
Total	6,030,000	5,810,000	6,200,000
Spacecraft physics:			
Fluid mechanics	1,065,000	805,000	850,000
High-temperature gas properties	385,000	280,000	310,000
Plasma physics	1,350,000	1,050,000	1,459,000
Total	2,800,000	2,135,000	2,619,000
Reentry heating and aerodynamics:			
Hypervelocity heating and heat transfer	2,980,000	2,800,000	2,750,000
Spacecraft configuration aerodynamics	2,610,000	2,550,000	2,230,000
Spacecraft dynamics and control	1,050,000	1,150,000	1,225,000
Reentry trajectory mechanics	1,110,000	950,000	795,000
Total	7,750,000	7,450,000	7,000,000
Spacecraft landing and recovery:			
Landing impact	350,000	350,000	370,000
Rocket landing technology	300,000	325,000	585,000
Atmospheric recovery systems	850,000	900,000	645,000
Total	1,500,000	1,575,000	1,600,000
Spacecraft environment and its simulation:			
High vacuum technology	846,000	725,000	835,000
Thermal radiation effects and simulation	400,000	325,000	535,000
High energy particle radiation effects	450,000	545,000	620,000
Meteoroid impact research	650,000	545,000	505,000
Fluid behavior and system design for zero gravity	300,000	360,000	305,000
Total	2,646,000	2,500,000	2,800,000
Control, guidance, and navigation:			
Guidance and navigation	845,000	1,115,000	2,130,000
Automatic control and stabilization	920,000	1,110,000	2,290,000
Advanced communications and instrumentation	475,000	675,000	2,110,000
Manned flight control and simulation	1,010,000	1,350,000	2,645,000
Total	3,250,000	4,250,000	9,175,000
Advanced data handling, reduction, analysis, and computation	1,400,000	1,500,000	1,500,000
Total, advanced research and technology	25,376,000	25,220,000	30,894,000

Flight program

	1961	1962	1963
Radio attenuation measurements	$500,000	$1,835,000	
Aerodynamic noise measurements		200,000	
Trailblazer reentry project	50,000	200,000	$200,000
Horizon sensors	700,000	700,000	700,000
Recoverable micrometeoroid probe		220,000	140,000
Reentry heating and materials experiments:			
Spacecraft and support	500,000	1,300,000	500,000
SCOUT launch vehicles		2,000,000	2,000,000
Total	500,000	3,300,000	2,500,000
Micrometeoroid satellites:			
Spacecraft and support		610,000	1,500,000
SCOUT launch vehicles			2,000,000
Total		610,000	3,500,000
Engineering test flight experiments:			
Scientific experiments		880,000	1,950,000
Launch vehicle (available under other programs)			
Total		880,000	1,950,000
True environment engineering test satellites:			
Spacecraft and support			2,000,000
SCOUT launch vehicles			2,000,000
Total			4,000,000
Flight reentry at hyperbolic velocities:			
Design and fabrication of spacecraft		880,000	2,970,000
Instrumentation development and support		60,000	1,480,000
Velocity package		640,000	1,750,000
ATLAS launch vehicles		2,400,000	4,000,000
Total		3,980,000	10,200,000
Total, flight program	1,750,000	11,925,000	23,190,000

HISTORY OF SPACECRAFT TECHNOLOGY PROGRAM

Mr. THOMAS. Tell us about this program.

Dr. SEAMANS. Mr. Dixon is the Acting Director of the Office of Advanced Research and Technology. He will speak to this program.

Mr. DIXON. Mr. Chairman, this program is to advance our knowledge of the new spacecraft that we are going to build in the next 10 or 15 years and there are very serious research problems that we know about that we must solve.

Mr. THOMAS. You are breaking it down between advanced research and technology, and in your flight programs you break it down into $30.8 million for research technology and flight programs $23.2 million. How long have you been working on this program?

Mr. DIXON. This is a continuing research program.

Mr. THOMAS. In 1958 or 1959?

Mr. DIXON. We started at the beginning of the Space Act, in 1958. By 1961 we had built up our efforts to $27 million, and $37 million in 1962.

In this type of program we try, wherever we can, to conduct research in ground facilities. Flight research is conducted only when ground-based research is inadequate.

Mr. THOMAS. This program is scattered all over. Where are you doing this work? Who are your contractors?

Mr. DIXON. We are doing this mostly in our centers, such as Langley, Ames, and Lewis Research Centers. The flight programs are conducted at Wallops Island and Cape Canaveral.

Mr. THOMAS. What are some of your problems? What are you doing at Lewis?

Mr. DIXON. Mr. Ames, the Director of the program, would like to elaborate in a little more detail on this if he may.

Mr. AMES. Mr. Chairman, with your permission we might start at the top of page 14–2 and take "Spacecraft materials and structures." Here we are attempting to extend our basic understanding of new materials for use in the advanced vehicles we are going to have to build, and how to use these materials in forming new lightweight, reliable structures.

You can see from the items here that we have such as "Physics and chemistry of solids," that this is a program of basic research in materials.

Mr. THOMAS. Where are you doing it?

Mr. AMES. Basic materials work is at Lewis and the applied materials work is at Langley.

SPACECRAFT TECHNOLOGY EMPLOYMENT

Mr. THOMAS. How many people are now doing this work?

Mr. MYERS. In this particular program, Mr. Chairman, we have about 1,700 people, including support people.

Mr. THOMAS. Based where?

Mr. MYERS. 600 at Langley, 870 at Ames, and 90 at Lewis.

Mr. THOMAS. Do you have any at Goddard?

Mr. MYERS. Not in this particular program, sir.

NATURE OF SPACECRAFT RESEARCH PROGRAM

Mr. THOMAS. What does this advanced research program look like for the future?

The more you experiment the more you are going to learn and one problem brings on another.

Dr. DRYDEN. Mr. Chairman, I think it may help in view of your long association with the old NACA, to say that this is in effect the kind of work that NACA tried to do to stay ahead of the aeronautical game. This is the work done in the research centers to stay ahead of the space game, as Mr. Holmes is engaged in doing. For example, the heating problem on coming back from the moon and distant planets is something that has been investigated over the years at successively higher speeds at Wallops Island. This covers, then, very largely the inhouse activities of advancing science in these fields of materials, of reentry heating, aerodynamics, landing, and recovery.

Mr. THOMAS. Outside of procurement of materials, this is all inhouse work, is it not?

CONTRACTORS FOR SPACECRAFT TECHNOLOGY

Do you have any outside contractors in this?

Dr. DRYDEN. Some of the large flight programs are supported by outside contracts.

Dr. SEAMANS. We have one outside contract on reentry vehicles. Republic Aircraft has been selected for negotiations. This is a program that will run around $5 million.

Mr. THOMAS. Where are they located, Dr. Seamans?

Dr. SEAMANS. They are located in Long Island.

Mr. THOMAS. This is the forerunner of your program.

LAUNCH VEHICLE TECHNOLOGY

Let us take a look at "Launch vehicle technology." You had $13,851,000 in 1961; $23,080,000 in 1962, as against a request for fiscal year 1963 of $31,690,000. (Reading:)

The purpose of the launch vehicle technology program is to advance the technology which would be required to support design and development of future launch vehicles; to solve technical problems faced by launch vehicles that are now being designed; and to examine alternate design concepts and systems for general application to space missions.

Mr. Reporter, put in the record justification pages RDO 15-1 through RDO 15-4.

(The pages referred to follow:)

LAUNCH VEHICLE TECHNOLOGY

Summary of requirements

	1961	1962	1963
Advanced system studies	$5,029,000	$6,116,000	$7,452,000
Vehicle technology	8,822,000	16,964,000	24,238,000
Total	13,851,000	23,080,000	31,690,000

OBJECTIVES

The purpose of the launch vehicle technology program is to advance the technology which will be required to support design and development of future launch vehicles; to solve technical problems faced by launch vehicles that are now being designed; and to examine alternate design concepts and systems for general application to space missions.

JUSTIFICATION

In order to meet the long-range goals of manned flight, lunar orbits and landings, and eventually planetary missions, the basic technology must keep pace with advancing vehicle concepts. Effort in this area is an integral part of the planning and development required for both current and future vehicles.

The need for high system reliability for manned space flight and the fact that the required large vehicle systems are now in their infancy dictate the need for a vehicle technology effort that is aimed well beyond the requirements of current developmental vehicles. Similarly, the long leadtimes associated with the development of these advanced vehicles requires that experimental and prototype hardware be developed in sufficient time to permit integration into the detailed design requirements of a particular vehicle. For example, improved electronic systems will be required that are capable of surviving the very long operating periods associated with lunar and planetary missions. The problems associated with the use of the high energy propellant liquid hydrogen for space missions must also be resolved.

Technical problems characteristically arise during the design phase of a vehicle and must be solved before design and development can proceed effectively. The problems of providing effective instrumentation and data for multibarreled rocket engine systems, the motion and state of liquefied gaseous propellants after long periods of weightlessness, and the sloshing of propellants in large

diameter booster tanks are but a few of the areas in which an intense technology effort will be conducted.

FUNDING REQUIREMENTS

Advanced systems studies

	1961	1962	1963
Operational and systems analysis	$4,059,000	$3,701,000	$3,950,000
Vehicle studies	970,000	2,415,000	3,502,000
Total	5,029,000	6,116,000	7,452,000

In fiscal year 1962, the major areas of effort were directed toward design requirements for the clustering of very large thrust engines for use in the SATURN and NOVA class vehicles, and toward conceptual studies of orbital operations as a means of achieving manned earth orbit, lunar, and space exploration missions. This work has formed the basis for the current vehicle systems plans for the accomplishment of the manned lunar landing program. This effort will be continued in fiscal year 1963 to consolidate and refine the results already accomplished; in addition, specific emphasis will be directed toward other requirements beyond the early lunar landings, as noted below.

Operational and systems analysis

This effort will include the operational and systems analysis required to establish future missions and system requirements with respect to vehicle design criteria, applications, and environment. During fiscal year 1963 a major effort will be directed toward defining the vehicle systems that will be required after the first manned lunar landing. In this area, particular attention will be given to the requirements for lunar bases, earth-lunar transportation and early manned planetary flights. Current study efforts concerning the economic aspects of advanced space transportation systems will be continued as a basis for developing cost optimization standards.

Vehicle studies

Vehicle studies will be conducted to analyze and evaluate advanced propulsion systems and their applications to stage or vehicle design; to establish conceptual and preliminary design requirements; to determine optimum stage sizes; and to evolve performance evaluation methods and techniques. In fiscal year 1963, specific attention will be given to the ADVANCED SATURN class with a nuclear upper stage and to the post NOVA vehicle.

Vehicle technology

	1961	1962	1963
Vehicle navigation and stabilization	$1,696,000	$2,893,000	$5,597,000
Materials and structural design	3,455,000	6,791,000	7,461,000
Flight dynamics	1,316,000	3,802,000	4,658,000
Communications and data processing	512,000	1,868,000	1,865,000
Instrumentation and test	1,843,000	1,356,000	2,792,000
Electrical power sources and distribution	----------	254,000	1,865,000
Total	8,822,000	16,964,000	24,238,000

In fiscal year 1962, the vehicle technology effort was oriented toward the medium and smaller launch vehicles, which are primarily intended for unmanned space flight, and the SATURN C–1. In fiscal year 1963, the emphasis will shift to the new class of large vehicles to be developed for manned space flight, the ADVANCED SATURN and the NOVA, and to orbital operations; the level of effort will be raised in fiscal year 1963 commensurate with the emphasis on the larger, more complex manned space flight vehicles.

Vehicle navigation and stabilization

This area covers the research, development, and test necessary to evolve reliable and economical guidance and control systems, subsystems, and components for launch vehicles. It also includes studies on the feasibility of self-adapting control systems; studies on the relative emphasis to be placed on manned versus automatic guidance and control; trajectory analysis; energy management; and analysis of advanced guidance and control concepts. Specific technical developments will be carried out in the areas of miniaturization and reliability improvement of electrical and electronic components.

Materials and structural design

Development and testing of materials, structures, and fabrication techniques are required on a continuing basis. Efforts include tests on materials at cryogenic temperatures, high energy forming techniques, large diameter (33–50 feet) tank fabrication, fuel sloshing control, titanium technology, effects of high temperature, structures for multiple engine stages, and investigation of advanced materials and methods.

Flight dynamics

Effort in this area will be directed toward investigations of atmospheric effects on vehicle dynamics, interaction of structures and guidance systems, interstage structural requirements, dynamics and transient characteristics of engine-out situations, base heating, effects of fuel sloshing, and structural flight dynamics. Specific hardware development and analysis will be performed on self-adapting controls, real-time computer evaluation, trajectory optimization, and aeroelasticity.

Communications and data processing

This area covers the development and test of reliable and economical communications and data processing systems, subsystems, and components required in future launch vehicles and those now under development. Specific areas of effort include vehicle telemetry, ascent tracking, computer intergration, advanced techniques for communications, data storage and processing, and studies of integrated launch vehicles and spacecraft communications and data processing systems.

Instrumentation and test

This technology supports the development of new instruments and test methods for launch vehicles including mass flowmeters, simple leak detectors, failure detection systems, reliable engine-out detectors, automatic checkout equipment, propellant instrumentation, and transducers for launch vehicle flight tests.

Electrical power sources and distribution

Effort in this area is required to provide reliable and economical components and systems for the supply and distribution of electric power for launch vehicle equipment. The effort will include integration of launch vehicle and spacecraft power supply and distribution systems, with specific work on batteries, fuel cells, gas-driven generators, rotary equipment, and electrical conductors.

NATURE AND SCOPE OF LAUNCH VEHICLE TECHNOLOGY

Mr. DIXON. This is being done at Marshall Space Flight Center and the Langley and Lewis Research Centers. This is done to advance our technology for our future launch vehicles. As you know——

Mr. THOMAS. What is the difference between this and the program just preceding this? This is mostly inhouse work at the laboratories?

Mr. DIXON. Yes, sir, this is mostly inhouse, with some studies by various missile companies.

Mr. THOMAS. How much are you spending on outside contracts? You are dealing with a vehicle, here. In the preceding program you were dealing with a broader subject.

Mr. DIXON. That is right. About one-third of this program is out of house.

Mr. THOMAS. Instead of the vehicle you may include the vehicle and everything on earth that goes with it?

Mr. DIXON. About $11 million would be used outside for various contract studies.

Mr. THOMAS. Would you call this more or less applied research where your preceding program is purely theoretical?

Mr. DIXON. No, sir. Both programs are mainly applied research and contain theoretical studies.

Mr. THOMAS. And what you learn in your space technology, you must, by virtue of the animal, apply some of that knowledge to your launch vehicle technology.

How far is that wrong, stating it in layman's terms?

Mr. WEBB. I think that is right. I think you would want to add the guidance problem here because you are moving from the basic research on to vehicles that you are going to fly and use, so you have to increase your capacity to develop the vehicle and to fly it and to use it.

Mr. THOMAS. You have navigation and stabilization, materials and structure design, flight dynamics, communications and data processing, instrumentation and test, and electrical power sources and distribution.

GUIDANCE SYSTEMS RESEARCH AND DEVELOPMENT

Dr. SEAMANS. One of these specific areas that we are investigating is the stability of a very large vehicle just after it leaves the launch pad. It has great flexibility. It is almost like a piece of macaroni, going up through wind shears that will put tremendous side loads on it. There may be instability as a result of guidance.

Mr. THOMAS. Where is your guidance system work carried on, in Huntsville? Are there private contractors involved in this?

Dr. SEAMANS. Both. A great deal of the inhouse work is done at Marshall and there is some work going on at Ames and some at Langley.

Mr. THOMAS. Are most of these funds here contractor funds or inhouse funds, this is $31.6 million?

Dr. SEAMANS. The actual breakout in this area yields a little over $20 million inhouse. Approximately $11 million will be done on contract.

CONTRACTORS FOR GUIDANCE SYSTEMS

Mr. THOMAS. Where are your contractors and who are they? Who is your contractor now? Do you have any contractors here for your guidance systems stabilization program?

Dr. SEAMANS. We haven't any one contractor for a particular area.

Mr. THOMAS. You are increasing your expenditures for navigation and stabilization up to $5.5 million in 1963.

Mr. DIXON. Dr. Haeussermann at Marshall is extending new concepts of guidance systems at Huntsville and we plan to expand this because we need this badly to learn how to stabilize these launch vehicles. They are larger and they require a more precise type of guidance than we have today.

Now we have one contract with the General Electric Co. who are doing some advance studies in concepts of new guidance systems. That is a small amount.

In addition, within launch vehicle technology, there are possibly 100 contracts for various studies all over the country in industry and universities. These amount to about $5 million.

Mr. THOMAS. Who are the competent people in this field? Do you go to the universities and the physics departments, or what?

Mr. DIXON. Universities like MIT are certainly competent in the guidance system. They are looking into some advanced concepts for us.

All of the missile companies have something to add in terms of the launch vehicle concepts, designs, structures, and some of the stabilization and controls.

Mr. THOMAS. Well, this is an item that is going to be with you as long as you are in business. There is no escape from that, is there? You do not know the answers. When you get one answer it usually brings on another question, doesn't it?

Mr. DIXON. That is right. This will give us new concepts and research data that will form the basis for design.

FUTURE EXPENDITURES FOR LAUNCH VEHICLE TECHNOLOGY

Mr. THOMAS. Will this figure of $31.6 million be a constant figure for the foreseeable future? Will it be less or more or what?

Mr. DIXON. We foresee that this will probably increase somewhat in the next 2 to 3 years.

LAUNCH OPERATIONS DEVELOPMENT

Mr. THOMAS. Take a look at "Launch operations development," which begins at RDO 16–1.

Mr. Reporter, include in the record RDO 16–1 and the tables on funding requirements.

(The material referred to follows:)

LAUNCH OPERATIONS DEVELOPMENT

Summary of requirements

	1961	1962	1963
Launch operations studies	$100,000	$596,000	$2,901,000
Advanced instrumentation		1,193,000	322,000
Range support operations			18,263,000
Total	100,000	1,789,000	21,486,000

OBJECTIVES

The purpose of the launch operations development program is to analyze operational requirements and to provide advanced ground instrumentation and equipment for launch vehicle operations. In addition, the required operational support for activities to be conducted in the new area at the Atlantic Missile Range (AMR) will be provided in this program.

JUSTIFICATION

During fiscal year 1963 a substantial increase in the level of effort for launch operations studies is anticipated in order to meet the planned and potential requirements for launch facilities for liquid-, solid-, and nuclear-propulsion vehicles. Propellant safety hazards, new concepts in ground support and launch facilities, and the transportation and recovery of large missiles and space

capsules are areas of investigation and development which are directly related to these requirements. A continuing requirement is the development of the special ground instrumentation needed to meet the increased complexity and data requirements for vehicles significantly larger than SATURN C–1. Special equipment and techniques will be studied and developed to accommodate the new problems associated with the use of the liquid hydrogen and nuclear upper stages.

With the initiation of the manned lunar landing program and the resulting increase in launch operations at the AMR, it was determined that the increased cost at the AMR for this program will be borne by NASA. The effort in fiscal year 1963 will support spacecraft flights on the C–1 vehicle and will provide a buildup for the ADVANCED SATURN and later for the NOVA launch vehicles. The scheduled use of Air Force personnel for fiscal year 1963 provided for an average military and civil service strength in support of the manned lunar landing program of 500 and an average range contractor support staff of 870.

FUNDING REQUIREMENTS

Launch operating studies

	1961	1962	1963
Handling of very large solid-propellant vehicles			$430,000
New concepts in ground support		$179,000	430,000
New concepts in launch facilities	$100,000	369,000	430,000
Ground support equipment for subcooling liquid hydrogen			215,000
Transportation of large vehicles			966,000
Effects of jet impingement on water			430,000
Acoustic studies		48,000	
Total	100,000	596,000	2,901,000

Advanced instrumentation

	1961	1962	1963
Development of optical equipment and devices		$567,000	
Development of telemetry equipment		328,000	$184,000
Offset frequency reference station		298,000	
Acoustic measuring system			138,000
Total		1,193,000	322,000

Range support operations

	1961	1962	1963
Supporting vehicles, equipment and supplies			$7,037,000
Rentals, utilities, contractual services, and support			11,226,000
Total			18,263,000

ACOUSTIC MEASURING SYSTEM

Mr. THOMAS. Look at "Acoustic Measuring System," on 16–4. What is that all about?

Mr. DIXON. This is for launch operations support at Cape Canaveral. Previously the Air Force paid all general costs, but this year part of their costs will be charged to us to carry out necessary support.

RANGE SUPPORT OPERATIONS AT CAPE CANAVERAL

Mr. THOMAS. Your big item here is your utilities for range support operations, isn't it?

Mr. DIXON. Yes. The supporting rentals, utilities, and services, most of this——

Mr. THOMAS. Where is this being spent?

Mr. DIXON. This is all spent at Cape Canaveral.

Mr. THOMAS. Reimbursable to the Air Force?

Mr. DIXON. Yes. There are 500 military people and——

Mr. THOMAS. What do you people have them for? I have often thought sometimes you spend too much money down there.

Mr. WYATT. The Air Force operates under contracts with Pan American, RCA, and various other major contractors.

Mr. THOMAS. The housekeeper is Pan American. And under Pan American is the Air Force and NASA. What part of this money goes to Pan American? What is the nature of that contract?

Mr. WYATT. Sir, they are contractors to the Air Force. We are tenants of the Air Force at the cape.

Mr. DIXON. We are paying for 870 people.

Mr. THOMAS. We have a little staff of our own down there. How many people do we have down there?

NATURE OF DIRECT AND REIMBURSABLE SUPPORT OPERATIONS

Mr. DIXON. We have 500 people down there under Dr. Debus.

Mr. THOMAS. You are paying the Air Force for 870 more?

Mr. DIXON. That is right.

Mr. THOMAS. What are they doing for you?

Mr. DIXON. They fuel the missiles, they maintain the ranges, the instrumentation. They record the data. They also send it through the computers, they give us back the data after a flight and supply all the necessary information we need in accomplishing a flight.

Dr. SEAMANS. The AMR people with support from Pan American and RCA are in effect the housekeepers. Our own people under Dr. Debus are actually responsible for carrying out the launch operation and for all the detailed development work we do there that is associated with our own flights.

Mr. WEBB. Our flight operations are stepping up substantially, which accounts for the increase.

It is not only to develop the new vehicles like CENTAUR and SATURN which are very important and difficult, but also the operational flights such as these flights we are making every 60 to 90 days during the next year, the manned flights.

Mr. THOMAS. Dr. Debus has a very tough job, there is no question about it. He is invaluable to your program. He has 500 men. On top of his 500 men, you are paying the Air Force for how many more?

Mr. DIXON. 870 people.

Mr. THOMAS. In truth and in fact Dr. Debus' 500 are furnishing the brains and there is the backbone of your operation and you are using 870 for housekeeping. Normally we don't like more than 15 or 20 percent of the people doing housekeeping work for any installation.

Dr. DRYDEN. I think housekeeping is too limited a word. I think a little history may help on this.

OPERATION OF FACILITIES AT CAPE CANAVERAL

The original arrangement at Canaveral was that the Air Force was the executive agent for all users of the range and they would fund all the so-called ordinary construction. The user would build his own launch stands.

Now with the coming of this large lunar program, there came the problem of whether to try to have two managements or one management at Cape Canaveral. It was decided there would be great confusion if NASA had an independent operation sitting alongside an Air Force operation. We made an agreement that the Air Force would be the general managers of the range to handle not only housekeeping in the sense of guards, cafeterias and trucks but also operating the tracking radars, the cameras, the computers that have been mentioned. Those things which deal with the performance of the launch vehicle.

Mr. THOMAS. Do you mean they operate the blockhouses for you?

Dr. DRYDEN. They do not operate the blockhouse and the launch stand. They operate the down-range instrumentation on the islands.

Mr. THOMAS. That is off the compound, is it not? Is it on the compound?

Mr. DIXON. The down-range instrumentation is off the compound.

COST OF REIMBURSABLE OPERATIONS

Mr. THOMAS. Anyway you look at it, haven't you got three layers now? What is your cost for Dr. Debus' crowd? How much do you transfer to the Air Force for 870 people and how much does the Air Force and our people pay to Pan American? You have three layers.

Dr. DRYDEN. We have $17 million to the Air Force for range support operations which they in turn do spend very largely with Pan American and RCA.

Mr. HOLMES. A large part of this is to facilitate our new range. A large part of this particular item has to do with establishing the 73,000-acre acquisition for the manned lunar program.

Mr. THOMAS. If I may interrupt you, now, you are paying the Corps of Engineers separate and above from this, aren't you?

Mr. HOLMES. Yes, for the purchase of the land but you see there is a——

Mr. THOMAS. I mean for their administrative costs you are paying them around 6½ or 7 percent as well as I remember. What was it, $1.6 million? That is all in addition to this.

Mr. HOLMES. The corps does not get into the procurement of diesel locomotives and utility barges.

Mr. THOMAS. That is separate.

Now, what do you pay Pan American?

Dr. DRYDEN. Nothing directly.

Mr. THOMAS. What is their fee for the overall cost? Of course you are paying it.

Mr. WYATT. As I understand, it costs the Air Force around $100 million a year to operate the base down there, and the down-range tracking stations. This $17 million is a proration of that share which under the new agreement is tied to our occupancy and use of the 73,000-acre tract.

Mr. THOMAS. Is the $17 million you transferred over to the Air Force mostly for utilities?

Mr. WYATT. For utilities and services.

Mr. THOMAS. Do you pay for 870 people, too?

Mr. DIXON. Yes, sir, we pay for those people, too.

Mr. WYATT. That is covered in the $17 million.

Mr. THOMAS. What part of this $17 million goes to Pan American?

Dr. SEAMANS. I do not think we can give you a detailed breakdown on that, but we can obtain it.

Mr. THOMAS. I am trying to determine Pan American's fee. It appears to me either you don't need Pan American or the Air Force. You have three layers and two certainly ought to be enough.

Dr. DRYDEN. It is not practical to operate there independently. As a practical matter it cannot be done.

Mr. WEBB. So we are paying our pro rata part for the arrangements they have.

Mr. THOMAS. You are using their land. They wanted to declare it surplus 60 days ago or 90 days ago. But certainly you don't need Pan American and the Air Force. You have three layers and three layers seem to me to be one too many.

Dr. DRYDEN. The Air Force is one extra layer; that is correct.

Mr. THOMAS. Is this your total cost to the Air Force, $17 million?

Mr. WYATT. The reimbursable cost; yes, sir.

PREVIOUS SUPPORT PROCEDURE

Mr. THOMAS. You have been at Cape Canaveral for a long time. For 1961 and 1962 you don't show any changes.

Dr. DRYDEN. As I mentioned, the agreement prior to this big expansion was that the Air Force budget would carry all the ordinary housekeeping costs.

Mr. THOMAS. Yes, but you reimbursed them just the same.

Mr. WYATT. We reimbursed them only for "peculiar expenses" where they had to spend money specifically for our jobs and not as part of the general operation.

Mr. THOMAS. You know the Air Force is not going to let you off the hook for 1958, 1959, 1960, and 1961 and then jump you up to $18 million in 1963.

Dr. DRYDEN. Does anyone in the hearing room have the figures for 1961 and 1962?

Mr. THOMAS. This is one of your big vital operations, and I think you can save a little money here by getting rid of one of those layers and I hope you will take a look at that.

Mr. WEBB. We certainly will take a look at it, Mr. Chairman, but I think the thing Mr. McNamara and I have tried to work out on all these joint operations with the Department of Defense was that we would not duplicate the facilities, we would not always transfer funds. In other words, if you have a national range and we are going to conduct a small portion of flights there they would simply absorb the cost as a part of the operation of the range.

Where our operations at Canaveral become large, we are working up to about 60 flights a year——

Mr. THOMAS. You are the big operation down there now?

Mr. WEBB. No, sir; there is a $100 million cost they incur to operate the range and we are reimbursing only $17 million. They have a very active program at Cape Canaveral.

Mr. THOMAS. Who owns that land where you are operating?

Mr. WEBB. The Air Force owns the land where we are operating now. We are acquiring additional land and merging the two into a national range.

Mr. THOMAS. Is the area 4 or 5 miles from the landing field where you are operating still their land?

Mr. WEBB. Yes, sir.

Dr. DRYDEN. To answer the previous question, reimbursement in the past year has been on the order of $2 million.

FEES PAID PAN AMERICAN BY AIR FORCE

Mr. THOMAS. Has anybody an approximate figure of what the Air Force pays Pan American?

Mr. WEBB. We can find that out for you.

Mr. THOMAS. Has anybody an opinion of what it is?

Mr. WYATT. I believe it is $100 million a year. I do not know what the payments are to the subcontractors.

Mr. THOMAS. You don't know what the fees are and the overhead and so forth?

Dr. SEAMANS. I can give it exactly—the fee is quite low. We can supply that for the record.

(The information is classified and has been supplied to the committee.)

FUTURE INCREASE IN SUPPORT OPERATIONS

Dr. SEAMANS. I would like to make one other point, Mr. Chairman: The figure of 450 to 500 people for Dr. Debus as of now and the expansion we are planning that shows in the book here as part of Marshall, actually includes an increase for Dr. Debus of around 300 or 350 people which will be required as that effort at Canaveral grows in the next few years.

Also, we can expect that the figure here of $17 million will increase substantially as we get underway in the manned flights, using the SATURN.

Mr. THOMAS. We do not quibble about Dr. Debus' operation in the slightest. He is one of your jewels.

Mr. HOLMES. In addition to that there are contractor people, so NASA at the end of 1963 probably will have a total of Government people and contract people of around 2,500 at the cape.

Dr. SEAMANS. The 500 figure refers just to the people reporting to Dr. Debus. There are in addition people there from Dr. Gilruth's operation, and from Goddard, Langley, and JPL. All of our centers have people there.

PARTICIPATION OF PERSONNEL AT HUNTSVILLE

Mr. THOMAS. What is your total personnel load at Huntsville? Is it around 2,000 or 2,500?

Mr. HOLMES. Around 2,500 at the end of fiscal year 1963.

Mr. THOMAS. What do you have there now?
Mr. HOLMES. Around 1,600.
Dr. DRYDEN. Are you counting contract people?
Mr. HOLMES. I am counting contractor people.
Dr. DRYDEN. I think the committee is likely to be a little confused here. The contractor people are——
Mr. THOMAS. If you add in your contract people—what we were interested in is the figure you carry on your payroll.
Dr. DRYDEN. 570 are employed in our launch operations setup.
Mr. THOMAS. That is all Dr. Debus'?
Dr. DRYDEN. The contractor people are added.
Mr. THOMAS. That does not mean anything. You could add a couple thousand and be a little under.
Dr. DRYDEN. There are people down there continually connected with Goddard and manned space flight when there is an operation. When there is an operation a lot of people go to Canaveral to participate in the launching.
Mr. WEBB. And during the time they are there if they are NASA people they come under the administrative control of Dr. Debus. He has a group working with the Air Force keeping our facilities operational, but when the SATURN is to be launched, people come from Huntsville and spend time there to get it launched. The contractors involved in the launching operation of an ATLAS are right there. Debus gives the directions even though they are not actually on his payroll.
When that SATURN launch has been made, those people go back to Huntsville. So for the time of the launching they are there under the administrative direction of Dr. Debus, who handles all this for us. He negotiates with the Air Force, carries out our part of the agreements that we have with the Air Force. We have certain responsibilities in connection with the handling of our operations so as not to interfere with theirs.

AGREEMENT ON NASA AND AIR FORCE COSTS AT CAPE CANAVERAL

Mr. EVINS. What type of agreement do you have with the Air Force with respect to acceleration of the cost in the future?
Mr. WEBB. We have an overall agreement with the Department of Defense under which certain of the duties are assigned, for instance, to the Navy, in connection with the recovery operations.
But the Air Force is the operator of the Atlantic Missile Range, and as we expand into these very large facilities we enter into agreements—for instance, right now we are just negotiating the arrangement by which they can put some of their TITAN launching pads on our land.
We in turn will use some of the launching pads they have for TITAN II to launch the GEMINI on the TITAN II. We are also in the process of asking ourselves, What is the work that has been done? What is the most efficient way to do it? And we try to work so we do not draw a direct line of separation.
We try to use the land and the facilities—whether it is ours or theirs—to do the job needed for the country.

Mr. EVINS. We understand that cooperation, but do you have any firm formula for future costs?

Mr. WEBB. I would say that we do not have very firm information as to exactly what their future costs are going to be, but we do have quite firm arrangements as to the kind of costs connected with our operations for which we will reimburse them. So in doing their planning they can look at the total they will do and know about what part we will put on them as a load and what we will pay for it.

Dr. DRYDEN. I might read the clause from the agreement on costs:

> NASA will defer the costs of all operation and maintenance at the new site. The Department of Defense will defer the operation and maintenance costs at Cape Canaveral in accordance with existing arrangements for the common use of the installation including the Atlantic Missile Range. The cost of operation and maintenance of any part of the Atlantic Missile Range which is solely required for the manned lunar landing program will be defrayed by NASA.

STUDIES ON HANDLING AND TRANSPORTATION OF LARGE VEHICLES

Mr. JONAS. Your justification indicates that you have an item of $430,000 in here, and $966,000 for handling large solid propellant vehicles of the NOVA type. Now, you are not going to have the NOVA ready for 6 or 8 years. Why do you need to spend that money this year?

Mr. DIXON. What we want to do there is to study how—when these large vehicles will be developed, somewhere in the future—we would handle them there at the cape.

Mr. JONAS. How do you know it will take $430,000 to study that? Wouldn't that be too much?

Mr. DIXON. These vehicles that we are talking about will require rocket motors that may weigh up to 2.5 million pounds and they can be up to 25 feet in diameter.

Mr. JONAS. Shouldn't you wait until you get closer to producing those large vehicles before you spend this money?

Mr. DIXON. We feel by studying these first we will know more about design concept of a large solid rocket, and how they must be handled and assembled for firing.

Mr. JONAS. I do not think you have justified these two items.

Mr. WYATT. We have a problem at the present time on the type spacecraft we fire. We have to have an on-pad time of up to 8 or more weeks. In other words, the vehicle has to sit on the pad while the checkout proceeds, making the pad unusable for any other purpose for a period of at least 2 months. This is true even for the ATLAS.

Mr. JONAS. You are not going to have NOVA ready to fire for 6 or 8 years.

Dr. SEAMANS. We are locating the NOVA pads at the cape in a way which would permit us to use solid propellants if the solids prove to be more efficient than the liquid stage.

In order to make this determination we must carry out studies. A large part of these studies are carried out by the Air Force, as we discussed during the first day of our session. They will actually build experimental models which will be tested, but we must carry out studies of the practical operational kinds of problems which would result from the use of these motors.

Mr. JONAS. Will it be a recurring item until you are ready for NOVA?

Mr. HOLMES. This fiscal year at AMR we must spend the advanced money to start that pad construction if we are to launch the first NOVA in 1967.

Mr. WEBB. Let me say just a word here, Mr. Jonas. We are planning the design of the liquid fuel NOVA pad so as to do a thorough planning job, where these large investments are being made at the Atlantic Missile Range.

It is our hope that if the solid NOVA is required, we could launch it from the same pads as a liquid NOVA, so we would not have to start from scratch with a solid launching pad. Many things are basic to the consideration of how you handle these very large solid fuel motors. Our studies are needed so that when we get the pads built, we can actually launch the solids when the time comes.

Mr. JONAS. Mr. Webb, that is not what your justification says. It bases it on NOVA.

Mr. WEBB. The large solids for NOVA are certainly part of an evolutionary process. We are going to plan the Atlantic Missile Range so that if the rendezvous technique does not work out, we will be able to launch NOVA. We propose building a liquid fueled NOVA, and have money in this budget to start it. But we also may find that the solids develop fast enough so that the substitution of solids for liquid will be made.

Mr. JONAS. You don't need to study this method of handling large engines unless you decide to go forward with NOVA, do you?

Mr. WEBB. But we are going forward with NOVA insofar as the planning, the siting, and ground installations are concerned. These are in many cases the large leadtime items that control the timing of the program.

Mr. JONAS. That is pretty long leadtime to study something that you are not going to use for 5 or 6 years.

Mr. WEBB. Not, sir, for a long-term project of this scope. This is one of our real problems. If we spent, without study, the large investment to put these launching pads in and then found we couldn't use large solid motors there, we certainly would not have done a good job.

Mr. JONAS. This is not to build a launching pad, this is a study on how to move large vehicles across country.

Mr. WEBB. But you cannot build an efficient pad without first studying how to move them to that launching pad and fire them off.

Mr. JONAS. This does not involve the building of a launching pad.

NATURE OF TRANSPORTATION AND HANDLING STUDIES

Mr. HOLMES. That may be the misunderstanding. It is not just cross country, sir. It is how we will handle them when we get them to the cape. We are presently thinking of canals right to the NOVA pads. We do have funds we are requesting in fiscal year 1963 for the NOVA pads. The design of that complex is going to depend, then, on how we get these large masses to the pad. So part of this business of these funds for study is to learn how, probably with hydraulics, we handle these great weights right down at the cape.

Mr. JONAS. Is it going to take $1 million to study whether you can float them down a canal?

Mr. HOLMES. And erect them properly and do the experimental work.

Mr. DIXON. How you are going to assemble them is a problem. Some of these motors will be in sections. We have to study how you erect them on the pad. How you handle them. We may be handling some high-energy propellants that could catch fire.

Mr. JONAS. Who is going to do this investigating, this study?

Mr. HOLMES. Dr. Debus is doing some of it right now.

Mr. DIXON. We are going to do this inhouse. We are going to get some contractors to look at this also.

Mr. JONAS. Have they ever had any experience moving that type of——

Mr. DIXON. The shipbuilding people have had some experience in this area. Already some of them have spent their own money on the project.

Mr. JONAS. Do you anticipate there will be a recurring item of over $1.5 million a year to continue this study?

Mr. DIXON. I think so until we get to the point where the initial design and any basic modifications have been fixed.

Mr. HOLMES. That is right, but not as long as 1967 because 2 or 3 years from now we are going to have to go into concrete if we are going to launch a NOVA in 1967.

Dr. SEAMANS. In summary, these launching studies are things that must be done in order to make proper decisions as to exactly how we phase the solids into the program.

ELECTRIC PROPULSION PROGRAM

Mr. THOMAS. Let us look at "Electric Propulsion."

Mr. Reporter, put 17–1 in the record, the table on 17–2, the reading material on 17–3, and the tables on 17–4 and 17–5.

(The material referred to follows:)

ELECTRIC PROPULSION

Summary of requirements

	1961	1962	1963
Advanced research	$4,575,000	$6,659,000	$12,198,000
Advanced technical development	2,204,000	5,770,000	10,725,000
Flight programs	385,000	5,152,000	7,724,000
Total	7,164,000	17,581,000	30,647,000

OBJECTIVES

The continuing objective of the electric propulsion program is to develop the technology of thrust generators required for accomplishment of missions utilizing advanced electric rocket systems. Development of thrust devices for nuclear-electric rocket systems is coordinated with the NASA nuclear power generation program which includes the NASA–AEC SNAP–8 program covered under the Nuclear Systems Technology budget.

JUSTIFICATION

Electric propulsion systems are to be developed to propel spacecraft on a variety of missions. They hold promise for providing adequate propulsion to transport heavy payloads to all the planets within the solar system.

Typical missions for which these systems will be applicable during the period 1967–75 are propulsion for—

(*a*) Vernier corrections of satellite orbits and space vehicle trajectories.

(*b*) Interorbital transport of large payloads from low orbits to higher orbits about the Earth.

(*c*) Transport of large payloads from low orbits about the Earth to low orbits about the Moon.

(*d*) Manned and unmanned interplanetary and deep space probes.

The three major types of electric propulsion systems which are presently under investigation are the arc-jet, the ion jet, and the magnetohydrodynamic (MHD or plasma) jet. At the present time, basic research, development, and flight programs are underway to establish the feasibility of the three types. The arc jet will be developed to an operational status in the 30 to 60 kilowatt size. After the development of the 30 kilowatt ion and plasma types, it should be possible to determine which of these two types merits development in the megawatt size. Should a marked superiority of one of these types become evident, it is likely that only one type will be developed in the megawatt size.

FUNDING REQUIREMENTS

Advanced research

	1961	1962	1963
Ion rocket engine research:			
Ion generation and acceleration	$1,119,000	$1,552,000	$2,346,000
Propellant research	229,000	385,000	890,000
Beam neutralization	384,000	473,000	1,108,000
Arc-Jet research	573,000	798,000	1,184,000
Plasma-Jet research	1,307,000	1,658,000	4,008,000
General research:			
Propellant feed systems	321,000	847,000	1,190,000
High vacuum research	275,000	388,000	584,000
Mission analysis	367,000	558,000	888,000
Total	4,575,000	6,659,000	12,198,000

ION ROCKET ENGINE

The propulsion principle of the ion rocket engine is based on the acceleration of charged particles. New knowledge is continually necessary to improve the materials, techniques, and equipment for developing, testing, and extending the operating lifetime of electric engines and their components. Some of the major problems requiring active research are higher temperature materials, larger ion sources, surface ionization, sputtering, secondary emission, voltage breakdown, high-temperature insulators, and propellant selection and flow. A program of advanced research in these areas is essential to provide the information for advanced technical development and the propulsion systems which will operate the spacecraft for future flight missions.

Ion generation and acceleration

In order to realize the potential performance of electric propulsion systems, the ionization and acceleration components must operate as efficiently as possible. Research is underway on materials, designs, and concepts for such systems. Individual investigations include study of contact ionization, catalytic ionization, and production of high-intensity electrostatic fields.

Propellant research

Cesium is currently used as a propellant for ion engines because it is easily and efficiently ionized and has desirable physical properties. However, cesium is a scarce and expensive element. Many other materials have been considered and investigated. One type of propellant material of interest is a colloidal suspension. The suspension is capable of being readily sprayed and can be given

an electrostatic charge and thus would be promising as a propellant. However, to date, it has not been possible to impart a large enough charge to the spray droplets, nor are the physical properties of the suspensions compatible with the system requirements. Research on colloidal suspensions, as well as on other promising materials, will continue in fiscal year 1963 with the funds requested.

Beam neutralization

An ion engine develops thrust by the acceleration and expulsion of positively charged ions. The ions are accelerated by a negatively charged electrostatic field. The ions must be neutralized with electrons when they have attained maximum velocity or they will slow down and remain in the electrostatic field. Continuing research in fiscal year 1963 is necessary to provide data and new concepts to insure efficient and reliable operation of future ion engines in the space environment.

ARC-JET RESEARCH

The propellant of an arc jet is a plasma (electrically neutral ionized gas) generated by a high temperature electric arc and accelerated through a jet nozzle. Research funded in fiscal year 1961 and fiscal year 1962 has made it possible to begin development of an experimental engine for flight tests. However, continuing research with funds requested for fiscal year 1963 is necessary on high temperature materials for electrodes and nozzles, electrode erosion, nozzle cooling, and propellant distribution and flow in order to improve the efficiency and performance of future arc-jet engines.

PLASMA JET RESEARCH

In the plasma, or MHD jets, the plasma is produced from the propellant by a high-energy, low temperature, electrical discharge accelerated by a high-intensity magnetic field. Research support of this kind of electric propulsion includes studies on sputtering, secondary emission, voltage breakdown, and efficient low-weight production of high-intensity magnetic fields. A variety of configurations and concepts for utilizing MHD propulsion are being studied in fiscal year 1962. From these studies, one or more concepts will be selected and a feasibility demonstration program will be initiated in fiscal year 1963.

GENERAL RESEARCH

This effort is to support research on problems common to all systems.

Propellant feed systems

The propellant feed system for electrical rockets includes propellant tanks, propellant heaters, pumps, and pipes. Research to support the development program includes corrosion-resistant high temperature material research, pump system technology, and heat transfer data and mechanisms.

High vacuum research

Since the electric propulsion systems will be designed to operate only in the space environment, ground facilities which simulate space conditions must be used in conducting research on these systems. One of the problems faced is the simulation of the almost perfect vacuum in space. Concepts, such as very low temperature condensers and chemical reactions of the gas molecules, are being investigated as methods for retaining as perfect a vacuum as possible in a ground-based facility while testing an operating propulsion device.

Mission analysis

Analysis of future applications for electric propulsion systems is necessary to determine configurations and operational requirements for future systems. Identifying key problem areas is a prerequisite for orienting the necessary research effort.

Advanced technical development

	1961	1962	1963
Prototype development:			
1- and 30-kilowatt arc-jet engines	$614,000	$1,500,000	$2,000,000
30-kilowatt ion engine	610,000	2,300,000	4,975,000
Advanced systems and components	980,000	1,970,000	3,750,000
Total	2,204,000	5,770,000	10,725,000

Flight program

	1961	1962	1963
Test and evaluation support	$385,000	$759,000	$1,424,000
Flight packaging		2,893,000	3,800,000
Flight vehicles		1,500,000	2,500,000
Total	385,000	5,152,000	7,724,000

SUMMARY OF ELECTRIC PROPULSION PROGRAM

Mr. THOMAS. You had $7,164,000 in 1961; in 1962, $17,581,000 and you are asking for fiscal year 1963, $30,647,000.

There is $12,198,000 requested for advanced research; $10,725,000 requested for advanced technical development and $7,724,000 for flight programs.

Give us a rundown on these.

Dr. SEAMANS. This is a program we have consolidated in the last 12 months. We now have all of this work centered at Lewis. Dr. Silverstein is here and I would like to have him discuss the program with you.

Dr. SILVERSTEIN. Well, Mr. Chairman, you will note the three items you mentioned are $12,198,000 for advanced research; advanced technical development, $10,725,000; and flight programs, $7,724,000.

The advanced research activities cover our in-house effort. The support of our people at the Center and the supplies and equipment that they need to operate the engines.

Mr. THOMAS. You have $12 million or $14 million in there for some facilities, too, over on your construction for the same item. That is laboratory facilities, test stands, and so forth.

Dr. SILVERSTEIN. The item we have that will provide tests for this is the Plum Brook space propulsion facility item. It is $25.5 million.

Let me show the relation of this facility to the testing.

The electric propulsion area is the future propulsion for space and we are here laying the background in a sound fashion for carrying this work on in the future.

Mr. THOMAS. Don't you want to charge any of it against the Atomic Energy setup? Do you want to charge it all against the electrical propulsion?

Dr. SILVERSTEIN. Let me state it this way: This facility we are putting out there is very much like a wind tunnel used to test aircraft. It is like the tanks we have used to test chemical engines. This facility is a tank system that can be brought down to low pressures corresponding to space.

We get the effect of the engine sitting out in space. The arrangements are made so we can take a complete system, including what is called the Snap 8 nuclear system and add to that the system that takes this energy the nuclear reactor is generating—heat energy. Through a conversion system—that is a conversion system either using mechanical equipment or a conversion system using what we call thermionic conversion or thermoelectric conversion, we make electric power. We take this electric power and feed it into these electric propulsion devices. That is the complete system. The tank at Plum Brook is designed so that it can present to this engine under test the conditions that the engine will encounter in space. You have a nuclear reactor system that is being developed separately under our Snap 8 program which we will discuss in a few minutes. You have the electric propulsion engines being developed here and some of the intermediate equipment being developed in our space power program.

ADVANCED RESEARCH

Mr. THOMAS. Break down your $30 million. You have three programs. You have $12 million here for research. That is going to be done at your installation?

Dr. SILVERSTEIN. Most of it will be done at our installation.

Mr. THOMAS. How do you arrive at this figure?

Dr. SILVERSTEIN. This figure is quite an exact figure because this is an area in which we have been working for the last 3 years. We have a certain number of people we are proposing to put in it, their salaries are in there, the support is in here and the supporting equipment. We have currently some 42 contracts throughout the country with people like Hughes Aircraft Co.

Mr. THOMAS. Hughes?

Dr. SILVERSTEIN. Hughes.

Mr. FINGER. There are 50 or 60 contracts in this entire area.

ADVANCED TECHNICAL DEVELOPMENT

Mr. THOMAS. We have "Advanced technical development." That is your next item. That is for running the installation out there?

Dr. SILVERSTEIN. We have two contracts in advanced research and some in advanced development. We separate here depending on the kind of contract it is. Some of the contractors are working on very fundamental things such as the basic materials we are using.

Mr. THOMAS. How many technical development contracts do you have for this $10.7 million, and what is your advanced thinking on it? How long will it take you to develop this when you come up with something? What is it going to cost outside of research?

Dr. SILVERSTEIN. In the advanced technical development—I do not have at my fingertips a complete separation between contracts in the advanced research and the advanced technical development. I feel there are about 40 contracts in the advanced technical development, possibly 15 or 20 in the advanced research. We have some contracts in the flight programs. In one flight program we are going to fly an electric propulsion engine, using a SCOUT vehicle. This is the program here that is shown on page 17–5.

Mr. THOMAS. And you have a table in here showing test evaluation?

Dr. SILVERSTEIN. Yes.

Mr. THOMAS. Flight packaging, I guess that means your vehicle.

When will you have it ready to fly, Doctor?

Dr. SILVERSTEIN. Late this year or early next year.

Mr. THOMAS. How long have you been working on this?

Dr. SILVERSTEIN. This program has been under way for about a year now.

Mr. THOMAS. You have been spending money here for longer than a year?

Dr. SILVERSTEIN. The flight test program has been on for a year.

Mr. THOMAS. How much have you spent on this program to date? You can see here around $54 million. Does it go back to 1958 or 1959?

Dr. SILVERSTEIN. This program was started in about—initially we had a small inhouse operation on this program back in 1956.

Mr. THOMAS. You have spent at least $55 million or $60 million.

Mr. DIXON. About $60 million.

Mr. THOMAS. How much will it take to wrap it up, Doctor?

Dr. SILVERSTEIN. This program will be a continuing program I think for a number of years ahead. I think it will probably level off at some value close to the 1963 value. When we get into the major flight tests later on that are mission-associated we will then be buying mission equipment and not development equipment.

Mr. THOMAS. When will you be able to get something in the air and really start testing?

Dr. SILVERSTEIN. The first test will be, as I say, the end of this year or early next year; preliminary tests of small engines to determine the question of space charges. When you inject ions behind the engine you have to neutralize them. They are positively charged and you have to put electrons——

Mr. THOMAS. You will put something in there for $60 million or $70 million and then you will really get started.

Dr. SILVERSTEIN. The first flight test is for a basic determination as to whether we have a problem in a certain area. There is a lot of work on the life problem already. These engines must run continuously for periods of time up to 3 years.

Mr. THOMAS. Will they be third stage?

Dr. SILVERSTEIN. They will be top stage, just before the payload.

Dr. SEAMANS. They will be in the spacecraft.

Mr. THOMAS. We will use them in planetary flights?

Dr. SILVERSTEIN. Yes.

Mr. THOMAS. That will be your last power?

Dr. SILVERSTEIN. The last power stage. It might be the third stage or the fourth stage. It depends on the booster used.

Mr. THOMAS. This program is going to play a tremendously important part in the future programs?

Dr. SILVERSTEIN. I think as we move along in our space effort and attempt to make more difficult flights that we see ahead 10 years from now these are the kinds of things we are going to have to have and we are trying now to lay down an adequate background for doing it.

I think it is remarkable—we all agree I think that in the last 4 years——

THEORY OF ENGINE OPERATION

Mr. THOMAS. What is the theory behind the successful working of this engine now?

Dr. SILVERSTEIN. What you do essentially in an ion engine is to heat up materials such as cesium or mercury. These are materials that have the property of being able to release electrons with a small amount of energy input and that is the reason you use them.

We take the ions that are created and pass them through a grid that has a high potential across it. As these ions, which are positively charged particles of matter, pass through this grid, this potential accelerates them. It is a great deal like accelerators that are used in basic physics work. You have helped to support them at different places in the country. When these ions are accelerated we raise them up to velocities as high as 50,000 feet a second or a hundred thousand feet a second. Depending on the potential we apply to this charge, we can get the velocity we choose.

The reason we want to use these electric engines is that they have these high velocities. That gives us what we call high specific impulse.

Mr. THOMAS. You don't use any solar energy in this theory at all, then?

Dr. SILVERSTEIN. This system could work from a solar energy source because basically you need heat energy in some form, whether it be nuclear energy or solar energy.

However, in looking over the future requirement, sir, it seems quite clear to all of us that we are going to have to rely on the nuclear energy source to do the missions that we see.

ELECTRIC PROPULSION CONTRACTORS

Mr. THOMAS. Who is your main contractor in developing your engine?

Dr. SILVERSTEIN. The principal contractor in the flight program right now is RCA. In the advanced research and in advanced technical development we have some 60 contracts that are distributed throughout the country—AVCO, General Electric, Pratt & Whitney—it is all over the country. There is a lot of basic work here in which many people are interested and for which they have high qualifications. They all see this as the direction in which things are going.

NATURE OF ENGINE TESTING

Mr. EVINS. Doctor, you say you are putting these motors in conditions as they would be in space and yet the object of our space effort is to find out what is in space. Do you already know?

Dr. SILVERSTEIN. We know the principal constituents of the space environment. For example, we do know there is a vacuum there. We know we have to have a vacuum that corresponds to space. We know the sun is shining on these things and we know how much energy is coming out of the sun.

Mr. JONAS. We are making these experiments and tests to find out, but you say at your laboratory you already know?

Dr. SILVERSTEIN. We know the principal elements. For example, the things we don't know as well are some of these energetic particles

streaming from the sun. We know about some, but we do not know about certain other ones.

We know about absolute values of densities in space. These are not well established, however. But the basic ingredients of the thing that correspond to what we are simulating in the tanks are there and these are the things that count.

We know, when we put these reactors in space with their associated equipment to provide thrust, that they are going to be looking out over most of the heavens at a temperature of about 3 degrees Kelvin, or 3 degrees above absolute zero.

Somehow or other we have to represent in our test program these conditions or conditions close to them if there is to be a sucessful flight. It is a requirement.

Mr. EVINS. You are testing the motors for endurance under those conditions, simulated as best you can?

Dr. SILVERSTEIN. That is a very good statement. An absolute requirement for success in flight.

The point is to use the kind of equipment we are going to later fly. This will be the period of time when we are working with sizes of things and powers that require these things. These SATURN boosters spoken of yesterday will cost $18 million to $25 million apiece. In each flight we lose the booster and the whole spacecraft and unless we do an adequate ground job here, then——

Mr. EVINS. All the contractors are building the motors and bringing them to the Lewis Research Center for testing. You are doing the operational testing. The contractors are bringing the motors in. Is this about your operation?

Dr. SILVERSTEIN. This is the way the operation will go. We do some small prototype motors in-house. Our people understand the art. They are in position to work with the contractor to help him and he can help us but we are working in this way. We have to develop people in-house that understand the subject.

Mr. EVINS. You expect to have some of these tests continuously for 3 years?

Dr. SILVERSTEIN. This program will be continuing indefinitely.

Mr. EVINS. I am talking about an individual test. Would you have one individual test running continuously for the 3 years as though a craft were in space?

Dr. SILVERSTEIN. When we get to our final part of the program we will probably, to avoid testing for 3 years, run accelerated tests of some sort. We will determine the best methods for doing this.

Mr. EVINS. How long have you continuously run any one test?

Dr. SILVERSTEIN. Currently I think we have run tests for a period of up to 3 weeks on small engines. There are problems in engine life here. One of the things we are trying to work out now is the problem of sputtering. These ion jets as they come out of the engine have to pass through grids, where they are accelerated. If these ions hit the grid, when they are going very fast, then they chip off a little piece of the grid and reduce the life expectancy of the engine. We are dealing with the problem of focusing the beam by use of these grids.

Mr. EVINS. Don't we have about all the wind tunnels we need in the country without building more?

Dr. SILVERSTEIN. This is not a wind tunnel.

Mr. EVINS. It is similar.

Dr. SILVERSTEIN. It encompasses the process of testing. I used the wind tunnel as an analogy. The wind tunnel tests different sorts of things. This facility is used for spacecraft propulsion systems whereas the wind tunnels are for testing aircraft that fly in the atmosphere. I use the analogy to bring out the point that Mr. Thomas mentioned yesterday that we are actually building a reactor here. We are not building a reactor. This is a piece of test equipment in which a reactor is placed.

ADVANTAGES AND DISADVANTAGES OF ELECTRIC PROPULSION SYSTEMS

Dr. DRYDEN. The great attraction of the electrical propulsion system, oversimplified, is that it needs one one-hundredths as much material to be carried along to do the same job as a chemical rocket. It has a disadvantage. It does not give you much thrust. You cannot use it to get off of the earth. You can only use it after you get away from the earth where you do not have gravity. Once you do that you only have to carry along one one-hundredths as much material to develop thrust as used by the other systems. This is the great attraction of it and why it will let you go to the planets.

LIQUID PROPULSION PROGRAM

Mr. THOMAS. Let us take a look at liquid propulsion. You have three big boosters here. Mr. Reporter, put page RDO 18–1, the explanatory material on page 2, and the tables on funding requirements for each item.

(The material referred to follows:)

LIQUID PROPULSION

Summary of requirements

	1961	1962	1962 supplemental	1963
1,500,000-pound-thrust engine	$50,849,000	$56,798,000		$55,316,000
200,000-pound-thrust hydrogen-oxygen engine	18,574,000	37,885,000		38,732,000
1,000,000-pound-thrust hydrogen-oxygen engine			$26,000,000	55,316,000
Analysis and experimental systems and component development	3,303,000	9,218,000		13,738,000
Total	72,726,000	103,901,000	26,000,000	163,102,000

OBJECTIVES

The purpose of the liquid propulsion program is to develop liquid propellant rocket engines of improved reliability and performance to support launch vehicle development; to anticipate requirements for space operations involving rendezvous between vehicles, lunar orbiting and landing operations, and long duration flights to planets or deep space; and, further, to undertake the required advanced design and experimental investigations so that the basic technology will be available when specific equipment developments are needed.

JUSTIFICATION

Since one of the NASA objectives in space exploration is manned operation in space, improved propulsion systems of greater thrust, improved reliability, better performance, and lower cost will be required. The liquid propulsion program is oriented to the development of a small number of reliable, appropriately sized engines to meet these requirements. Supporting this effort is the propulsion technology for spacecraft that will provide a technological base for the propulsion developments necessary to carry out space exploration missions planned by NASA for the next decade.

NASA is currently engaged in the development of three major new engines to support the launch vehicle requirements for the manned lunar exploration mission. These are the 1,500,000 pound thrust RP–1-oxygen engine (F–1), the 200,000 pound thrust hydrogen-oxygen engine (J–2) and a 1 million pound thrust hydrogen-oxygen engine (M–1). The latter engine is being undertaken in fiscal year 1962 to meet the requirements of the NOVA vehicle. Also provided, as a continuing effort, is a program of analysis and experimental development to provide design specifications and to demonstrate the practical application of advanced design concepts for spacecraft propulsion.

F–1 engine

The 1,500,000-pound thrust engine will be clustered to provide the high thrust required in the ADVANCED SATURN and NOVA vehicles to launch manned spacecraft and to conduct manned lunar explorations. Development of the engine is being performed by Rocketdyne, a Division of North American Aviation, Inc., under the technical direction of the Marshall Space Flight Center. Engineering design and fabrication are accomplished at the Rocketdyne plant in Canoga Park, Calif. Component test operations are conducted in the Santa Susana, Calif., facility of Rocketdyne and engine tests are run on test facilities provided at Edwards Air Force Base in California. The current development program is scheduled to complete preliminary flight rating tests of the engine during 1963. These tests will be followed by a continuing improvement program leading to engine qualification for launch vehicle use during 1965.

J–2 engine

The 200,000-pound thrust hydrogen-oxygen engine is a high specific impulse rocket engine that will be used in upper stages of advanced vehicles. It is specifically planned for use in the second and third stages of the ADVANCED SATURN configuration and in the third stage of the NOVA vehicle. The 200,000-pound thrust engine project is also being produced by Rocketdyne under the technical direction of the Marshall Space Flight Center. The development program is scheduled to complete preliminary flight rating tests in 1963, with qualification of the engine during 1964.

M–1 engine

The 1 million-pound thrust class liquid hydrogen-liquid oxygen engine will be developed primarily for the NOVA second stage. The M–1 engine will make it possible to accomplish manned lunar landing and return without refueling in the space environment. In the absence of such an engine, it would be necessary to resort to multiple clustering of smaller engines in the NOVA second stage, thus forcing a compromise between a smaller number of engines (with sacrifice in payload capability) and a larger number of engines (resulting in increased system complexity and jeopardy to system reliability). The contractor, when selected, will perform engineering design and development leading to early accomplishment of a preliminary flight rating test and qualification for use in manned missions. As in the case of the F–1 and J–2 engines, M–1 development and test effort will be under the technical direction of the Marshall Space Flight Center.

FUNDING REQUIREMENTS

1,500,000-pound-thrust engine (F–1)

	1961	1962	1962 supplemental	1963
Design	$535,000	$468,000		$442,000
Component development	21,232,000	11,357,000		8,408,000
Component test	5,509,000	9,619,000		10,465,000
Engine development	13,353,000	13,132,000		12,537,000
Engine test	2,631,000	10,271,000		10,631,000
Fabrication and test equipment	4,736,000	5,032,000		4,536,000
Propellants	2,853,000	6,557,000		8,297,000
Propellant transport equipment		362,000		
Total 1,500,000-pound-thrust engine	50,849,000	56,798,000		55,316,000

The development of the 1,500,000-pound-thrust engine has progressed through design and component development to operation of the engine for long duration and rated thrust. The first full-scale engine run was made in August 1961 at reduced thrust. In December 1961 the engine was operated at full thrust. A major phase of engine system design effort, which began in fiscal year 1959, will terminate in fiscal year 1963 with the completion of the preliminary flight rating tests; engineering effort will continue thereafter for full engine qualification, reliability improvement, product improvement, and support of flight programs. Engines funded under the respective vehicle development programs will be delivered for use in vehicle development programs in the first half of 1963.

200,000-pound-thrust hydrogen-oxygen engine (J–2)

	1961	1962	1962 supplemental	1963
Design	$725,000	$451,000		$353,000
Component development	5,467,000	6,779,000		4,763,000
Component test	1,125,000	6,431,000		6,086,000
Engine development	609,000	5,169,000		6,861,000
Engine test		4,596,000		7,524,000
Fabrication and test equipment	6,315,000	6,926,000		4,072,000
Propellants	4,333,000	7,533,000		9,073,000
Total, 200,000-pound-thrust hydrogen-oxygen engine	18,574,000	37,885,000		38,732,000

The 200,000-pound-thrust hydrogen-oxygen engine was initiated in September 1960 and is being developed on a time schedule which will bring it to preliminary flight rating tests at approximately the same time as the 1,500,000-pound-thrust engine. The major part of the fiscal year 1962 funding was devoted to development testing of the engine components. The first engine test is scheduled for February 1962. The major emphasis in fiscal year 1963 will be in the engineering design, fabrication, and testing of engines, leading to completion of the preliminary flight rating tests in late fiscal year 1963. Thereafter, testing to full thrust and duration will be continued toward the objective of developing an upper-stage engine of very high reliability. The present development contract with Rocketdyne extends beyond the preliminary flight rating tests to include development and testing for the purpose of qualifying this engine for use in manned vehicle systems.

1,000,000-pound-thrust hydrogen-oxygen engine (M–1)

	1961	1962	1962 supplemental	1963
Design			$1,000,000	$885,000
Component development			7,000,000	9,072,000
Component test			5,500,000	9,957,000
Engine development			3,500,000	11,063,000
Engine test				7,744,000
Fabrication and test equipment			7,000,000	3,319,000
Propellants			2,000,000	13,276,000
Total, 1,000,000-pound-thrust hydrogen-oxygen engine			26,000,000	55,316,000

Since the M–1 engine is an entirely new development, it constitutes a critical leadtime element in the NOVA development schedule. The supplemental funds requested in fiscal year 1962 will provide for the early initiation of the program effort needed to insure availability of a reliable engine to meet the NOVA program schedule requirements. Fiscal year 1962 funds will be used primarily to provide necessary fabrication and test equipment and to design and develop engine components. During fiscal year 1963, component work will be continued and testing of the full-scale engine will be initiated.

Analysis and experimental development

	1961	1962	1962 supplemental	1963
Launch vehicle engines	$1,156,000	$4,213,000	----------	$7,899,000
Spacecraft engines	2,147,000	5,005,000	----------	5,839,000
Total, analysis and experimental development	3,303,000	9,218,000	----------	13,738,000

To insure that the required developmental capabilities will exist when needed, it is necessary to continue an aggressive analysis and experimental development program in anticipation of the requirements for booster and space propulsion. A second important benefit is the minimization of costly "quick fixes" which are inevitable if the required engineering foundations have not been established before development programs are undertaken.

Mr. THOMAS. This is the development of the big boosters. You are getting into your big money now. You are requesting $163 million for 1963. You had a supplemental of $26 million and a regular appropriation of $103 million for 1962. That was around $130 million and you had $72 million in 1961. You are developing three big boosters.

F–1, 1.5-MILLION-POUND-THRUST ENGINE

Let us take the 1.5-million-pound-thrust engine; that is the F–1. Who is your contractor and what will this engine cost?

Mr. HOLMES. This contractor is Rocketdyne. The total cost will be about $200 million.

Mr. THOMAS. How long have they been working on this?

Mr. HOLMES. About 3 years.

Mr. THOMAS. Rocketdyne has the M–1, too?

Mr. HOLMES. Aerojet does.

Mr. THOMAS. Where is Rocketdyne located?

Mr. HOLMES. Canoga Park, Calif. These three engines supply all the engines for our ADVANCED SATURN and NOVA for the present plans. There is that much standardization in the program. The F–1 gives the large-thrust engine for the first stage and has a kerosene and oxygen engine. The other two engines are for the upper stages, using hydrogen and oxygen.

Mr. THOMAS. Let's stay in the 1.5-million-pound one. When will this be completed and how much have you tied up in it?

Mr. HOLMES. We should have our PFRT in the middle of 1963. We have tied up in these fiscal years $163 million.

Mr. THOMAS. Did you start before 1961 on this big engine? Did you have an expenditure on it?

Mr. HOLMES. Yes, sir.

Mr. WYATT. We started in January 1959, to contract for the development.

Mr. HOLMES. I beg your pardon. I am in error.

Mr. THOMAS. It is about $175 million. Will this wrap it up?

Mr. HOLMES. About $200 million total will wrap it up.

Mr. THOMAS. Will you need any funds beyond 1963 for it?

Mr. HOLMES. Yes, sir.

Mr. THOMAS. How much?

Mr. HOLMES. $30 to $40 million.

Mr. THOMAS. How many are you going to get?

Mr. HOLMES. This is for the development. This does not buy the engines.

Mr. THOMAS. How many will you get on your development cost? Half a dozen?

Mr. DIXON. Normally what you do in development, you take an engine and run it through a qualification test, a series of tests, one after another.

Mr. THOMAS. Does it cover one, Mr. Dixon?

Mr. DIXON. Yes, sir. There are about 75 engine equivalents involved in the whole development.

Mr. WYATT. There are actually 75 engines.

Mr. THOMAS. For this million-and-a-half-pound thrust?

Mr. WYATT. Yes.

Mr. THOMAS. What is the next one?

J–2, 200,000-POUND-THRUST ENGINE

Mr. HOLMES. J–2, 200,000 pounds, a hydrogen fuel engine to be used in the second stages of the ADVANCED SATURN. These are liquid hydrogen and oxygen. Hydrogen is the fuel and oxygen the oxidizing agent.

Mr. THOMAS. What is the total cost?

Mr. HOLMES. $150 million runout cost.

Mr. THOMAS. Will this $38 million complete the R. & D. on it?

Mr. HOLMES. No. We will have some small amount in 1964. I would think it would be somewhere around $30 to $40 million.

Mr. THOMAS. Who is your contractor?

Mr. HOLMES. This is Rocketdyne.

Mr. THOMAS. The same one?

Mr. HOLMES. The same one.

M–1, 1-MILLION-POUND-THRUST ENGINE

Mr. THOMAS. What about your million-pound-thrust engine?

Mr. HOLMES. The million-pound-thrust contractor, Aerojet.

Mr. THOMAS. Where are they located?

Mr. HOLMES. Sacramento. This is for the second stage of the NOVA, this M–1 engine.

Mr. THOMAS. Will $55 million wrap it up?

Mr. HOLMES. No, sir. It will be around $130 million total figure.

Mr. THOMAS. How much do you have to date? Did you have an expenditure in 1961 and 1962 on it?

Mr. HOLMES. No. This is just starting with the 1962 supplemental.

Mr. THOMAS. We gave you $26 million about 2 weeks ago.

Mr. HOLMES. Yes.

Mr. THOMAS. You haven't got it yet, have you?

Mr. DRYDEN. It just passed the Senate.

Dr. SEAMANS. We are negotiating with Aerojet right now.

Mr. HOLMES. That is right.

Mr. WEBB. This is a new engine of a very large size used in this very new hydrogen technology.

COMPETITION FOR ENGINE DEVELOPMENT

Mr. THOMAS. Do you have no other capability in the country? One company is building all of the engines?

Mr. WEBB. No, sir. The 200,000-pound-thrust engine could be clustered. Five of those engines would develop a million pounds, or if the million pounds can be developed in one engine, then you will have a more efficient engine. We have direct competition between North American Aviation, Rocketdyne Division, and Aerojet in this liquid hydrogen technology which I believe Dr. Dryden will tell you is the most promising upper stage energy source that we have at this time and for the next, say 10 or maybe longer years.

Mr. JONAS. You are going forward with both concepts at the same time?

Mr. WEBB. Well, the kerosene engine, the F–1, 1,500,000-pound-thrust engine, is for the first stage to get off the ground.

Mr. JONAS. I mean the 5–J–2's.

Mr. WEBB. Yes, and the M–1's are also going forward.

Mr. JONAS. They are competitive systems, though?

Mr. WEBB. They are competitive sources of power using hydrogen fuel. If we can develop the big hydrogen M–1 engine, it will be more efficient. If we cannot we will have to cluster the smaller J–2 hydrogen engines.

NEED FOR BOTH J–2 AND M–1 ENGINES

Mr. JONAS. You don't need both of them. You are going forward with both because you do not know which will be better?

Mr. HOLMES. We do need both because, for the second stage of Nova we are thinking of 4-million-pound thrust which means, without an M–1 large engine, we would have to cluster 20 J–2 engines for equivalent power. This would be impracticable.

Mr. THOMAS. Clarify what you mean for the record between the first and second stage. One gets them off the ground.

Mr. HOLMES. That is the first stage.

Mr. THOMAS. What is the next stage?

Mr. HOLMES. The next stage on top of that is the second stage. As you get into the higher stages, you are carrying that weight all the way from the ground up to final mission. As you get into the higher stages it becomes more important to have them weigh less.

Mr. THOMAS. You have competition between the two engines.

Mr. HOLMES. Between the two engines that Mr. Webb was talking about, the 200,000-pound one and the million-pound one, they are both second-stage. The 200,000 pound J–2 is the second stage engine specifically required for the ADVANCED SATURN. It is not big enough for the second stage of a NOVA.

Mr. THOMAS. Address your remarks to Mr. Jonas and explain why you need them both.

Mr. HOLMES. The 200-000-pound J–2 engine will be clustered in five, as Mr. Webb said, for the second stage of the ADVANCED SATURN. For the second stage of the NOVA we need so much more total thrust, we will have to cluster 4 of these 1-million-pound M–1 engines. We feel it is not technologically feasible to cluster 20 of the 200,000-pound engines.

Mr. WEBB. There are certain uses of the 200,000-pound engine we have in the program where a million-pound engine would not be required. We need both engines.

Mr. JONAS. You say in the justification you need the J–2 engine because it is planned for use in the second and third stages of the SATURN and in the third stage of the NOVA. You say you need the M–1 engine for the second stage of NOVA.

Mr. HOLMES. That is right. Maybe if I give the count of the engines. In the ADVANCED SATURN, this J–2, for the second stage propulsion will be clustered in a set of five. In the third stage, there will be a single J–2. But in the NOVA, the second stage, there will be four of these very large million-pound M–1 engines. In the third NOVA stage, once again, a single J–2 engine will propel the escape stage.

Mr. JONAS. You won't need the J–2 engine except in a third stage?

Mr. HOLMES. We will need it in the third stage in NOVA only but in second and third stages in the ADVANCED SATURN.

Mr. JONAS. Never in the first stage?

Mr. HOLMES. Never in the first stage, that is correct.

TOTAL COST OF M–1 ENGINE

Mr. THOMAS. When will you wrap this up? Will this $55 million complete your expenditure on this 1-million-pound-thrust engine?

Mr. WEBB. No, sir. This is just the beginning of development of a very large engine, which will run over several years.

Mr. THOMAS. What is your best guess of the wrap-up cost?

Mr. HOLMES. $130 million, sir.

Mr. THOMAS. $130 million? How much do you have appropriated to date?

Mr. HOLMES. None appropriated to date for the M–1.

Mr. WEBB. I wanted to point out that if we should arrive at the point several years from now where we had real trouble clustering 20 engines, which is a terribly difficult thing, working with a fuel that stores at minus 423°, and we should be delayed as much as a month, we will have sacrificed in this delay the cost of this M–1 engine. Because we have such a large operation and there are so many important benefits to be gained we feel it is very important to go forward with this big engine. This is a very advanced concept; to develop a 1 million, 1.2 million thrust engine using liquid hydrogen and oxygen is stretching the state of the art about as far as any of the scientists are willing to do at this time.

TOTAL COST FOR DEVELOPMENT OF LIQUID PROPULSION ENGINES

Mr. THOMAS. You have a figure of $163 million here. What will be the wrap-up figure and how much time will it take? You have to get them off the ground and test them and you have a lot of money in here for that. What will the total cost be?

Mr. HOLMES. For these engines if you take the sum of the runout of the three engines, it is $480 million. For this other general analysis item you might add another $50 million. I would say somewhere between $530 and $550 million.

Mr. WEBB. Here again, Mr. Chairman, let me say this is the only program the United States has for developing these very large engines to give you power for spacecraft.

Mr. THOMAS. This is the backbone of your program.

Mr. WEBB. That is right. This is the power to get out into space for military or civilian purposes, depending on the need of the Nation.

OPERATION OF LIQUID HYDROGEN AND LIQUID OXYGEN ENGINES

Mr. RHODES. Could I get Dr. Dryden or somebody to explain the chemistry of the liquid hydrogen and liquid oxygen engine?

Dr. DRYDEN. It forms water or steam.

Mr. RHODES. In other words, it is the same process by which water is formed from the combination of hydrogen and oxygen?

Dr. DRYDEN. Yes.

Mr. THOMAS. Is that temperature a minus 400?

Mr. WEBB. Minus 423 for the liquid hydrogen.

Mr. DIXON. These two chemicals react. They form steam. You always use an excess of hydrogen in your reaction whereby the hydrogen is heated up into a gas and this gas is very light. That in turn gives us a very high performance. As these gases pass through the nozzle, this is the reason——

Mr. THOMAS. This is scarce. I have seen them loading it.

Mr. RHODES. Is the emission from the nozzle hot?

Mr. DIXON. Yes. The gases are. In the chamber itself, it is about 4,000 degrees Fahrenheit. As it exhausts it cools down to about 1,500 degrees Fahrenheit.

Mr. RHODES. How do you get a high temperature in the chamber? You start out with a very cold substance.

Mr. WYATT. This is a combustion process, the same thing as burning kerosene and oxygen, but in place of kerosene if you use hydrogen you get a lot more heat output per pound of hydrogen burned than you do kerosene. It is a more efficient combustion in terms of the weight of fuel you have to carry along. It burns as in the case of a welding torch, for example, if you bring hydrogen and oxygen together and light it.

Mr. RHODES. You call this a chemical fuel?

Mr. WYATT. Yes. It goes through a chemical burning process to generate or release the energy that is in the fuel.

Mr. THOMAS. Mr. Rhodes, with this thing sitting on the pad with the fuel at minus 423 degrees Fahrenheit, what kind of container is it in?

Mr. RHODES. That is a very interesting question.

Mr. WEBB. What kind of pipes do you pipe it with and what kind of pump do you use? These are problems we must solve but if we do, you have a much more efficient engine.

PROGRESS IN DEVELOPMENT OF LOW-TEMPERATURE MATERIALS

Mr. RHODES. How close are you to solving it?

Dr. SILVERSTEIN. That is one of the things we are working on very heavily, the best materials to contain it. Normally most of the work we have done with materials and structures has been at room temperature, sometimes at high temperature. There hasn't been a great deal

of work trying to develop materials that will stand up at minus 423 Fahrenheit. Materials get stronger at these temperatures, curiously enough.

Mr. THOMAS. What are you using now?

Dr. SILVERSTEIN. We are working with three or four different materials.

Mr. THOMAS. It is out at Plum Brook.

Dr. SILVERSTEIN. We are doing a lot of the work on hydrogen pumping and hydrogen turbines, hydrogen piping, how you handle it in pipes and insulate it. These problems need to be solved. There is a problem of getting materials to go to these low temperatures without getting so brittle at low temperature that they shatter like glass but rather still have ductility left at low temperatures. We have a problem in going through space. What happens when a micrometeoroid hits a tank of this brittle material? These are all problems in advanced technology that are included in the studies.

Mr. THOMAS. What metals are you using there?

Dr. SEAMANS Stainless steel.

Dr. SILVERSTEIN. Stainless steel in the CENTAUR. More efficiently if we can use titanium, we can get a tank for half the weight. If we have to use more ductile materials we go to copper, or aluminum, but here we run into weights that are higher than titanium. We are trying to work with titanium and get the titanium alloy that will be ductile enough at low temperature to save the weight. Each pound of weight we put in the upper stages of one of these big space vehicles costs us 1,000 pounds of initial takeoff thrust at the booster stage. This is the reason, if we are going to carry a heavy load, that the engines are getting bigger in the booster stages. We are trying to carry as much payload as we can. We do not want to carry dead load; we want to keep the weight down.

DEVELOPMENT OF ADVANCED SATURN AND NOVA

Mr. RHODES. Mr. Chairman, there is another thing that bothers me a bit because the first time I got into this program at least we were not talking about any SATURN C–5. As I recall we were going to fly the CENTAUR, the SATURN, and then go to the NOVA. We had a picture of the NOVA. Somebody had drawn it.

I know the reason for the C–5. It is for this rendezvous technique. What is the cost of the C–5? Do you have any way of telling how much it will cost the American taxpayer to put this stage that we now call the SATURN, C–5 or the ADVANCED SATURN into the program?

Dr. SEAMANS. We discussed that some yesterday.

Mr. RHODES. I do not remember a total cost.

Dr. SEAMANS. The figure we discussed for the ADVANCE SATURN development including the firing of 10 development models came to about $1½ billion.

Mr. WEBB. If you can do that you understand the NOVA may be be held back; if you use the rendezvous technique you may save a couple of years and you then have a choice as to how rapidly you build the NOVA.

Mr. RHODES. Oh, Mr. Webb, let's not kid each other. You and I both know we are going to build the NOVA; we are going to build it just as fast as we possibly can.

Mr. WEBB. You have some choice, depending on world conditions and the problems we face at the time. You certainly are not going to get the NOVA available for direct ascent to the moon as soon as you can get the C–5 available for the rendezvous operation.

Mr. JONAS. You have a lot of money in here for the NOVA.

Mr. WEBB. That is right.

Mr. JONAS. I do not see any evidence of slowing down NOVA.

Mr. WEBB. We have to be in position to move it rapidly, if we cannot do the rendezvous with the C–5.

Mr. HOLMES. If NOVA were parallel to the C–5 in time schedule we would have another several hundred million dollars in here in development of facilities. It is a year behind, as we testified yesterday.

Dr. SEAMANS. Stated another way, if we were to have the same target date for manned lunar landing using NOVA that we have for the ADVANCED SATURN we would add about $400 million to this budget.

Mr. JONAS. Isn't the truth of the matter that you put in the ADVANCED SATURN in order to try to get a man on the moon 2 or 3 years earlier than you originally planned?

Dr. SEAMANS. Yes.

Mr. WEBB. And because it may turn out to be an effective and efficient way for building spacecraft in orbit, and because the work with the rendezvous technique may have extremely important implications for our military programs. We are going to do a lot of flying with the C–5 to gain the experience of many, many hours of work in space. It will be a workhorse.

SOLID-PROPULSION PROGRAM

Mr. THOMAS. Gentlemen, let's look at solid propulsion. Put 19–1 and the table on 19–2 in the record.

(The material referred to follows:)

SOLID PROPULSION

Summary of requirements

	1961	1962	1963
Systems and components development	$1,899,000	$4,297,000	$7,944,000
Total	1,899,000	4,297,000	7,944,000

OBJECTIVES

The purpose of the solid-propulsion program is to develop the solid-propellent rocket motors and systems that may be required for space missions, and to establish advanced designs, concepts, and materials for improving performance and reliability of solid rocket motors and components.

JUSTIFICATION

The solid-propulsion program is directed toward the application of the inherent virtues of solid rockets to the space missions. These desirable characteristics, already applied in weapons systems, are simplicity, reliability, rela-

tive ease of handling and use, and long storage life with continuous readiness for operation.

The program has two main categories: those tasks that support a possible solid-propellent booster stage of a launch vehicle for the direct lunar ascent, and those that support space proplusion systems first used after long-term exposure to the space enviromnent. In the first category, the special vehicle problems associated with the use of the very large solid-propellent stage must be defined. Special systems, such as an abort warning system analogous to those available for liquid booster stages, must be defined and developed. Optimum component design and fabrication methods must be investigated. The satsifactory integration of solid-propulsion elements into the complex lunar launch vehicle requires a vigorous attack on these and similar problems by the National Aeronautics and Space Administration. The Department of the Air Force has been assigned development responsibility for the large solid motor which may be used in a solid-stage vehicle for manned space flight.

In the second category of space proplusion, the potential ability of solid-propellent systems to withstand prolonged exposure to space environment must be verified, and high-performance motors for possible lunar or planetary retro or takeoff use must be demonstrated in prototype form.

FUNDING REQUIREMENTS

Systems and components development

	Fiscal year 1961	Fiscal year 1962	Fiscal year 1963
Mission, motor, and system studies	$306,000	$457,000	$953,000
Solid motor feasibility demonstration	921,000	1,968,000	2,065,000
Motor subsystem investigations	380,000	936,000	2,383,000
Components and materials		312,000	1,907,000
Storage and environment effects	292,000	624,000	636,000
Total, systems and components development	1,899,000	4,297,000	7,944,000

NATURE AND SCOPE OF SOLID PROPULSION DEVELOPMENT

Mr. THOMAS. You have systems and components development here, a total of $7.9 million. How long have you been carrying on this program?

Mr. DIXON. Mr. Chairman, we have been carrying this on since our start in a very small effort. It appears the solid rocket has use in the spacecraft itself. We have found that we can use a small solid rocket to, say, slow down a spacecraft like the RANGER when it goes to the moon, and to help in the landing of it. We have found that a small solid rocket motor works well.

Mr. THOMAS. Who is your contractor here, Mr. Dixon?

Mr. DIXON. In this area here——

Mr. THOMAS. Is this inhouse work?

CONTRACTORS FOR SOLID PROPULSION DEVELOPMENT

Mr. DIXON. This is about 30 percent inhouse, 70 percent outside. We have contractor people in this, such as Rocketdyne and Thiokol of California. Universities include the Institute of Technology and Princeton. Others are the Battelle Memorial Institute, Stanford Research.

Mr. THOMAS. You are trying to develop a small solid booster. You are not dealing in this item with the fuel, itself. It is a booster, isn't it?

Mr. DIXON. We are looking at the smaller ones that we can install on the spacecraft where we can use them when we want to get into an orbit, or slow down, or use them for controls. This program is not involved in the development of the large solid rockets.

Mr. THOMAS. What is the thrust on this one?

Mr. DIXON. These types are in the order of, say, 300 to 5,000 pounds thrust.

Mr. THOMAS. What progress are you making? How much will it take to come up with a workable one?

Mr. DIXON. In this type of component development, we are working on both propellants and the propellent casings. We are making lightweight cases. We have developed a new type plastic that will make the case lighter and make it very efficient for installing in the spacecraft. We visualize a continued research effort in this in order to bring this new technology toward successful development.

Mr. THOMAS. Does this cover the booster and the vehicle? Does it cover the whole field?

Mr. DIXON. No; this covers the very small little rockets that we install in the spacecraft.

Dr. SEAMANS. By rockets we mean the motors, not the total vehicle.

Mr. THOMAS. This is all motor, not the total vehicle?

Mr. DIXON. That is right.

Mr. THOMAS. What progress are you making? When will you wrap one up? What will be your total cost? What is your best guess?

Mr. DIXON. In this area we are going to keep continuing bringing these new ideas along, sir, and as we get them we will incorporate them in advanced spacecraft of the RANGER, SURVEYOR types and some of the newer spacecraft that are in our future program.

Mr. THOMAS. Who did you say the outside contractors were?

Mr. DIXON. In this area we have about 70 percent of the activity outside.

Mr. THOMAS. Who are they?

Mr. DIXON. There are Aerojet General, Allegheny Ballistic Laboratory, Hercules Powder Co., Lockheed Propulsion Co. out in California, and the Thiokol Corp. Then several nonprofit groups, like Stanford, Battelle, and Princeton are working in this area. They are working on the nozzle design and new materials for nozzles. Some of them are working on combustion problems. Some of them are studying the vector control potential of small solid rockets. This represents a series of small studies to obtain new ideas for design of small solid rockets.

SPACE POWER TECHNOLOGY

Mr. THOMAS. Let's look at space power technology. Put RDO 20–1, all of 20–2, the table on 20–4, and the narrative following that in the record.

(The material referred to follows:)

SPACE POWER TECHNOLOGY

Summary of requirements

	1961	1962	1963
Advanced research	$3,938,000	$4,885,000	$6,934,000
Advanced technical development	4,975,000	9,759,000	13,238,000
Total	8,913,000	14,644,000	20,172,000

OBJECTIVES

The objective of this program continues to be the development of the technology of generating electrical power from solar and chemical energy sources for use in space vehicles.

JUSTIFICATION

All space vehicles are critically dependent upon their electrical power systems for the power to operate instruments, communications equipment, and other equipment. Solar cells and batteries have been successful in meeting these needs to date. However, these devices have limitations and disadvantages which make them undesirable for some of the more advanced spacecraft. It is, therefore, necessary that other promising concepts such as solar heated systems using turbo-electric or thermionic power converters, chemical combustion auxiliary power systems, and fuel cells for energy conversion or energy storage be developed. Such characteristics as higher reliability, lighter weight, longer life, radiation resistance, lower cost, and higher power capability are the objectives.

FUNDING REQUIREMENTS

Advanced research

	1961	1962	1963
Solar cell research	$1,090,000	$1,534,000	$2,300,000
Fuel cell research	250,000	665,000	900,000
Thermionic conversion	700,000	970,000	1,200,000
Solar concentrators	400,000	600,000	750,000
Distribution and control technology	253,000	300,000	384,000
Magneto fluid dynamic power generation	300,000	450,000	500,000
Battery research		100,000	400,000
Thermal energy storage	400,000	266,000	500,000
Thermal radiation properties	545,000		
Total	3,938,000	4,885,000	6,934,000

Solar cell research

Because of the inherent simplicity of solar cells and their excellent performance in the past, it is anticipated that solar cells will continue to be very important indefinitely. However, major problems have been encountered in such areas as performance degradation caused by the high-energy electrons and protons of the Van Allen belts and solar flares, high cost, and weight. More efficient solar cells would therefore be desirable. In fiscal year 1963, the extensive theoretical and experimental program on radiation damage initiated in fiscal year 1962 will continue, in conjunction with efforts to develop radiation-resistant solar cells and other static devices for the direct conversion of solar energy to electricity. A large effort will be directed toward the development of low-cost solar cells using thin film techniques or other processes which can be automated. Reduced expenditures for solar cells in flight programs, as well as higher reliability should result from this program.

Fuel cell research

Fuel cell research offers the possibility of direct and highly efficient conversion of chemical energy or heat to electricity in a static system with a minimum of moving parts. This technology should reduce system weight, improve reliability, and permit the construction of higher power systems than are possible with present methods. For certain missions such as manned flights, the elimination of the requirement for orientation of the spacecraft to the sun and the availability of byproducts such as water for crew consumption or equipment cooling are attractive features.

Advanced technical development

	1961	1962	1963
Solar cell technology	$540,000	$600,000	$500,000
Fuel cell technology	500,000	850,000	750,000
Solar-thermionic power		900,000	1,000,000
Solar concentrator development	100,000	1,030,000	1,150,000
Distribution and control equipment	535,000	950,000	1,688,000
Thermoelectric power conversion	225,000	390,000	600,000
Battery improvement program	475,000	839,000	1,300,000
Dynamic power conversion	2,600,000	4,200,000	6,250,000
Total	4,975,000	9,759,000	13,238,000

Solar cell technology

Continuing activity in this area will be concerned with reducing the weight and cost and improving the reliability of solar cell power supplies. Methods to be used include the concentrating of solar panels so that the reflective surface is an integral part of the panel structure in order to increase the solar intensity impinging on the solar cells thus resulting in more power output per solar cell. Work on improved assembly techniques for solar panels using welding in place of soldering where possible, improved thermal coatings for lower cost, lighter weight, and higher reliability will be pursued.

Fuel cell technology

Prototype system development to solve hardware problems and investigate long life and reliability problems are the objective of this project. Some types of fuel cells which have developed sufficiently to be nearly ready for flight use will be emphasized. One type involved will be regenerative hydrogen-oxygen cells which may be used as replacements for batteries in solar power systems and in primary systems with potential applications in manned vehicles. The development of auxiliary devices such as special pumps, controls, and water separators will be included. The selection of a fuel cell as the first choice for a power supply on manned lunar vehicles emphasizes the requirements for increased system development work.

Solar-thermionic power

A solar-thermionic development program was initiated in fiscal year 1962. The continuation of the development of this prototype flight weight solar-thermionic power system, generating 1 to 5 kilowatts, will help solve engineering problems directly affecting life, reliability, and weight problems. This project will provide valuable information on practical problems which must be solved in the development of the thermionic diode and the solar concentrator. It is anticipated that effort will also be conducted in integrating the thermal energy technology into a solar-thermionic power system.

Solar concentrator development

Work in this field is the technical development effort which complements the work on solar concentrators conducted under the advanced research program. Emphasis will be on the development of protoype mirrors using the materials and fabrication technology acquired under the research program. Early flight tests will be conducted to study deployment and orientation problems for lightweight storable mirrors. An engineering experiment is being prepared for an orbital test to determine the lifetime of various reflective surfaces in the space environment, with complementary additional laboratory experiments under simulated conditions.

Distribution and control equipment

An improvement in the reliability of converters and inverters is required because of numerous failures of this equipment. Funds are requested for fiscal year 1963 for development of improved devices, circuits, packaging techniques, and testing methods. Effort will also be directed toward improved power control equpiment such as battery charge controls, system protective devices, and switchgear development.

Thermoelectric power conversion

For certain applications, such as solar probes, power generation by thermoelectric conversion is highly desirable. It offers several important features such as radiation resistance, ability to operate in a high temperature environment and lower cost. In previous years emphasis has been directed toward materials research by Government-sponsored research with limited engineering work done on the development of reliable, long-life generators for space use. In fiscal year 1963 funds for this project will provide for initiation of the required development effort to fill this need.

Battery improvement program

Although batteries have been used with some success in space vehicles, limitations of present hardware continue to be of concern. Efforts to solve technical problems associated with seals, separators, and process control have been effective and must continue in fiscal year 1963. Extensive work is planned in battery evaluation including life testing, qualification testing, and detail failure analysis for use as a guide in further product improvements. Life tests are of particular importance as the results will bear directly on the margins of safety adopted, system weight, and reliability. Development of improved types of batteries with lighter weight and greater reliability will also continue.

Dynamic power conversion

In previous years technology has been developed in the extraction of power from heat by use of turbines and reciprocating engines. For higher power systems, dynamic conversion is advantageous because of its light weight and economy. The Sunflower 3-kilowatt auxiliary power system, for example, produces power, by concentrating solar energy with a parabolic mirror to boil mercury with the vapor being used in a closed system to drive a turbine connected to a generator. Under this project the technology of moderately large solar power systems is being developed in anticipation of space vehicles reqiring several kilowatts and up to 1 year's life.

Work will also be done on dynamic conversion of chemical energy through development work on engines for use with cryogenic fuels. Application of this technology will involve both relatively short missions requiring several kilowatts and missions where mechanical power is required for roving vehicles in future planetary probes.

SCOPE OF SPACE POWER DEVELOPMENT

Mr. THOMAS. You say:

The objective of this program is to continue the development of the technology of generating electric power from chemical energy sources for use in space.

Mr. Dixon, is this part of your program, too?

Mr. DIXON. Yes, sir. As you know, our spacecraft need electrical power in order to operate equipment in space. We are conducting research and advanced technical development on power generation devices such as solar cells, fuel cells, thermionic conversion, solar concentrators, magneto-hydro dynamics, batteries, and thermal energy storage. Most of our spacecraft use solar cells at present. However, future spacecraft need larger and more efficiently produced quantities of electrical power. We must conduct research in order to provide the technology to design and produce reliable, efficient, and relatively inexpensive power generation devices.

Mr. THOMAS. What is the difference between this and the one Dr. Silverstein is carrying on in Cleveland?

Mr. DIXON. Dr. Silverstein is carrying on most of this particular effort. He is doing a major portion of this at his laboratories and then we are contracting for some of this activity.

Mr. THOMAS. We have been doing this for years. Does not Dr. Abbott have a monopoly on this field? Are you using Dr. Abbott here, Dr. Silverstein?

Dr. SILVERSTEIN. He has done a tremendous job of taking readings on the radiation coming from the sun for many, many years with the stations all around the world. That information has become useful to us now in our program.

Mr. THOMAS. Is there any conflict between this and your program?

Dr. SILVERSTEIN. Well, as I mentioned in discussing that, there are three energy sources that are available to us in space and they are useful over different time periods.

Mr. THOMAS. Is this pure research? Are you doing most of it at your laboratory or are you trying to apply this to an engine or a vehicle?

Dr. SILVERSTEIN. About half of this is in-house effort.

Mr. THOMAS. This appears to me to be pure research.

Dr. SILVERSTEIN. It is essentially basic research, yes, with some applied research and advanced technical development.

We are building some hardware. You will notice on page RDO–20–4, the bottom line says dynamic power conversion. In this area we are building some hardware that takes the heat energy that is being created from the sun and transmits that heat energy into an intermediate fluid such as mercury.

POWER FOR OPERATING SYSTEMS IN SPACECRAFT

Mr. THOMAS. This is solar fuel technology, fuel cell technology, solar contractor development. What is this battery improvement program, dynamic power conversion? What do you mean by that? That is a big item.

Dr. SILVERSTEIN. That is the method by which the heat energy that the sun provides is converted into electric power. In other words, you have heat, but heat of course alone is not useful. You have got to change this heat into useful electric power.

Mr. THOMAS. How does this fit into your program?

Dr. SILVERSTEIN. As we go up in space with our larger vehicles, we have to have some means of providing power for operating communications systems and for operating the life support systems for the people who are living in the spacecraft.

Mr. THOMAS. This hasn't a direct connection with your boosters or engines. You are not doing your experiment here with that in mind. This is pure basic research. What use do you intend to put it to? Will it be in the capsule itself?

Dr. SILVERSTEIN. We have batteries for example, in the MERCURY capsule for providing electrical power. Batteries cost thousands of dollars a day.

Mr. THOMAS. We have been working on this program for 7 or 8 years. Haven't you been doing some of this work?

Dr. SILVERSTEIN. Yes, sir; in the small in-house effort. The effort is getting larger because our needs are getting greater.

MANPOWER FOR SPACECRAFT TECHNOLOGY

Mr. THOMAS. What will be the manpower charge against this space power program?

Mr. MYERS. There are 673 people involved in this.

Mr. THOMAS. They are located at Cleveland?

Mr. MYERS. 540 are at Cleveland.

Mr. THOMAS. Where are the rest?

Dr. SILVERSTEIN. There are some at Langley on the solar concentrator. That is the program you saw earlier.

Mr. MYERS. We have 50 people at Langley, and 22 at Goddard.

Mr. THOMAS. Fifty at JPL?

Mr. DIXON. No, 50 at Langley.

Dr. SILVERSTEIN. There are 25 or 30 people at JPL.

Mr. THOMAS. You are scattered all over.

Dr. DRYDEN. I think we are not getting through on what this is. It is the city powerplant for the satellite. The converter has a big mirror that concentrates heat on the boiler and boils the liquid. The liquid is mercury, usually, or there may be an intermediate fluid.

PROGRESS IN SPACE POWER DEVELOPMENT

Mr. THOMAS. This is not for the booster. This is the capsule.

Dr. DRYDEN. This is power for the capsule. It is a miniature powerplant. It has got a turbine that drives a generator and generates electricity.

Mr. JONAS. Dr. Dryden, you told us about this at least 4 or 5 years ago. What progress have we made?

Dr. DRYDEN. Four years ago would be just about the time the program was started.

Mr. JONAS. You talked to us about this kind of energy then. That has always been what you had in mind.

Dr. SILVERSTEIN. We have made progress in this. One interesting development is the possibility of using the sun's energy directed against what we call thin film solar cells, where we spray on a surface a very thin film of semiconductor material. This is material that delivers electric power when the sun shines on it. This has value, I think not only eventually in space but also on the ground where we can make direct conversion of electric power from the sun.

In addition to that, in these dynamic systems we have built a system that is under construction now and under test that takes this heat from the boiler along the same lines as your city powerplant and working with Mercury as a fluid, passes it through a turbine, drives a generator and thus generates power. We have already built prototype systems for small amounts of power. We have developed concentrators or mirrors, very accurate mirrors, that are used to focus the sun's rays onto the boiler.

Mr. THOMAS. Dr. Silverstein, are we going to undercut and undersell these AEC boys in producing this power and fuel?

Dr. SILVERSTEIN. No. We look upon solar power for space as being for smaller requirements, smaller power uses, say perhaps up to 5 or 10 kilowatts.

Mr. THOMAS. Didn't Dr. Abbott say this is going to revolutionize all the power fields?

Dr. DRYDEN. The answer should be "Yes," it will beat nuclear power every time for small power; a nuclear powerplant is for much larger quantities of power.

Mr. BOLAND. Only in the upper atmosphere?

Dr. DRYDEN. There are uses of solar power. Many people are studying this. The trouble is that the countries that need it most find even the capital cost too much for their economy. The problem there is to get something very cheap. This development that Dr. Silverstein has mentioned, if it really can be brought to completion at low expense, does offer a possible solution of this solar power in underdeveloped countries. It will really make it useful. The present form of solar cells are extremely expensive. Solar cells on the TIROS satellite, what does it cost——

Dr. SILVERSTEIN. They cost you about $200,000 a kilowatt.

Dr. DRYDEN. That is a lot of cost to get a few watts of power.

Dr. SEAMANS. From the standpoint of our own missions the 30 to 60 kilowatts appears to be very attractive from a nuclear standpoint. Certainly when you get to megawatts, which we need for electric propulsion, we will need a nuclear power unit.

Mr. JONAS. Is your continuing research in an effort to reduce the cost or develop a more efficient system?

Dr. SILVERSTEIN. I would say both.

Mr. JONAS. I take it from what you have said you already have developed the system.

POWER SYSTEMS CURRENTLY IN USE

Dr. SILVERSTEIN. There are systems in use in all of our current spacecraft that are called solar cells. I think we have shown you examples of them here in the past. These solar cells exist now and are the primary source of power for most of the scientific satellites that we have sent up.

Mr. THOMAS. You are using the every day.

Mr. WEBB. We get deterioration of solar cells now. We are trying to find a way to prevent some of the deterioration that takes place out in space for these systems.

Dr. SEAMANS. Radiation does have a deleterious effect on solar cells and one of the areas of investigation is to find coatings for the cells that will provide and maintain an efficient system for long periods of time.

Mr. JONAS. If you have made all of this progress and you have a system now that you know is foolproof, aren't you spending an awful lot of money?

Dr. SEAMANS. We do not really know that it is foolproof for let's say communication satellites where we are looking for reliability of 2 to 3 years.

Mr. JONAS. You won't ever know until you use it.

FUTURE POWER REQUIREMENTS

Dr. SILVERSTEIN. There are different requirements for different missions.

For example, as we look forward in the future, which we must do in looking at this business, if we are going to keep it moving, the power requirements that we are going to need are going to be very expensive if we continue the path we are using now for the small power. It is just not tolerable. What we have to do as we look forward to use a larger power is to do something in the way of advancing technology to reduce these costs. This is the origin of our work, and the need for it.

Mr. JONAS. You contemplate this will be a continuing program then?

Dr. SILVERSTEIN. Yes; it is a continuing program because there will be no purpose in sending spacecraft out into space if there is no power aboard.

Mr. THOMAS. May I interrupt a moment? What is the difference in this cost? Of course, if you have got to have this energy and this is the only way you are going to get it that is something else, but what is the difference in this and the program we went into a while ago where you develop an ion booster.

Dr. SILVERSTEIN. For missions that require the ion engines, we are looking forward to the need of powers in megawatts instead of kilowatts. The solar system will not provide power in megawatts.

Dr. DRYDEN. It would take reflectors the size of a few football fields to get enough energy.

NUCLEAR SYSTEMS TECHNOLOGY

Mr. THOMAS. Gentlemen, let's take a look at nuclear systems. We are beginning to run into some more money. Put page 21–1 and the table on 21–2 in the record. Also include the tables on 21–6 and 21–8.

(The material referred to follows:)

NUCLEAR SYSTEMS TECHNOLOGY

Summary of requirements

	1961	1962	1963
Advanced research	$3,902,000	$5,814,500	$15,327,000
Advanced technical development	20,750,000	43,000,000	73,690,000
Flight programs	398,000	1,420,000	33,945,000
Total	25,050,000	50,234,500	122,962,000

OBJECTIVES

The purpose of the nuclear systems technology program continues to be the acquisition of the technology required for the development of nuclear rocket propulsion systems capable of carrying large payloads on space missions over extended time and distances, and the technology to develop nuclear electric power generating systems for application to electrical space propulsion or as auxiliary power sources in spacecraft.

JUSTIFICATION

The accomplishment of advanced manned missions in space will require vehicles utilizing engines having greater specific impulse than is now thought possible with chemical rocket engines. Nuclear rocket engines using hydrogen as the propellant can meet this requirement. The application of a nuclear upper stage to large launch vehicles will increase vehicle payload capability significantly for extended missions (e.g., interplanetary flight). Conversely, a given payload can be carried by lighter and simpler launch vehicles, having fewer

total stages, if a nuclear stage is incorporated. Depending upon the chemical vehicles available, certain space missions, requiring rendezvous if performed by all-chemical rockets, can be accomplished without rendezvous by the use of nuclear stages.

The current joint AEC–NASA program for the development of nuclear rockets is aimed at the design, development and testing of nuclear rocket reactors, engines, and flight test vehicles leading to an initial series of flight tests in the 1966–67 period. In fiscal year 1963 the development and test of KIWI reactors will have reached the point where the full nuclear rocket engine (NERVA) development program, involving the procurement and testing of engine components, subsystems, and complete systems will be expanded. Also in fiscal year 1963, the major development effort leading to the flight test vehicle stage initiated in fiscal year 1962, will be expanded. In addition to the effort aimed at the 1966–67 flight test series, research, development, and test of an advanced reactor design will be included in the AEC–NASA program. Basic research in support of the entire nuclear rocket program will also be continued.

The nuclear electric generating systems portion of the program is directed toward the general advancement of the basic technology with specific application in demonstration of the feasibility of a long-life, compact, lightweight, nuclear turboelectric system (SNAP–8) at the 30 kilowatt power level. In addition, the technology required for the design and development of more advanced and higher power systems in the megawatt range will be supported. This advanced work will include work on turbogenerator and direct conversion systems.

FUNDING REQUIREMENTS

Advanced research

	1961	1962	1963
Nuclear propulsion:			
Hydrogen properties	$330,000	$400 000	$780,000
Radiation effects	761,000	806,000	1,940,000
Dynamics and control	120,000	280,000	1,276,000
Engine systems and components	810,000	980,000	2,471,000
Advanced concepts	650,000	680,500	1,562,000
Power generation:			
Mechanical component research	416,000	728,000	1.810,000
Direct power conversion	215,000	520,000	1,540,000
Liquid metal research	290,000	670.000	1,720,000
Waste heat rejection	200,000	440,000	1,270,000
Advanced concepts	110,000	310.000	958.000
Total	3,902,000	5,814,500	15,327,000

Advanced technical development

	1961	1962	1963
Nuclear propulsion:			
Reactor test support	$4,495,000	$5,900,000	$5,500,000
Nuclear rocket engine development	2,300.000	18,000,000	36.000,000
System and component technology	6,100,000	6,600,000	7,800.000
Propellants	2,105,000	2,700,000	12,500,000
Power generation:			
SNAP-8 development	2,400,000	6,000,000	7,000,000
Megawatt system design studies	50,000	200,000	710,000
Component technology	3,300,000	3,600,000	4,180,000
Total	20,750,000	43,000,000	73,690,000

Flight program

	1961	1962	1963
SNAP-8 vehicle integration			$7,600,000
Nuclear rocket flight-test stage (RIFT) development	$300,000	$1,300,000	25,700,000
Operational safety	98,000	120,000	645,000
Total	398,000	1,420,000	33,945,000

NUCLEAR SYSTEMS RESEARCH

Mr. THOMAS. This is nuclear systems. You have advance research of $15 million. This program has been carried on for at least 5 years. You have advanced technical development, $73,690,000 against $43 million in 1962 and $20 million in 1961. Then you have your flight programs. It looks like you are getting ready to put something in the air. You jumped from $1.4 million to $33.9 million. Give us a quick rundown on this, the state of the art, et cetera.

Dr. SEAMANS. Mr. Chairman, as we discussed yesterday, or Mr. Webb discussed, we have a joint office with the AEC. Mr. Finger is in charge of this effort, this joint effort, and in addition is the Director for Nuclear Systems in our Advance Research and Technology Office. I would like to have Mr. Finger address himself to these questions.

Mr. FINGER. Mr. Chairman, this budget pays for the NASA portion of the work aimed at developing nuclear systems for space. The AEC, in addition, is funding for certain work which comes within the AEC area jurisdiction——

Mr. THOMAS. Let's go back to your advance research. That is the proposition that has been going on for several years jointly with the AEC. Where is this research being done?

Mr. FINGER. This portion of the work is being done largely inhouse but also with outside contract support. The inhouse work is primarily at the Lewis Research Center.

CONTRACTORS FOR NUCLEAR SYSTEMS

Mr. THOMAS. Who are your outside contractors?

Mr. FINGER. Cornell Aero Lab; Lockheed is doing some work on radiation effects and JPL is supporting some of our advanced concepts work.

Mr. THOMAS. What is Lockheed doing for you?

Mr. FINGER. Lockheed is doing some radiation effects work. It was mentioned earlier that liquid hydrogen introduces problems in the development of materials that can contain it. These problems are aggravated by adding the radiation effect resulting from nuclear reactors. Lockheed is doing this research work at its Georgia facility.

Mr. THOMAS. What part is done inhouse and what part is Lockheed doing in this advanced research?

Mr. FINGER. The only work Lockheed is doing is about a million and a half dollars of work in the radiation effects item which is listed as the second item on page RDO–21–2.

Mr. THOMAS. There are laboratories in Tennessee and you have one in Oregon, on Long Island, in Hanford. It seems they should be the right places to test it. Where do you test it, at Jackass Flats?

Dr. DRYDEN. That is on the nuclear propulsion, ROVER project, Jackass Flats.

Mr. FINGER. There is radiation effects work also at the Oak Ridge National Laboratory and we do that by transfer of funds to the AEC.

Mr. WEBB. A good many of these AEC labs are used, but under funds appropriated for them. These are the funds for the part that NASA does.

TOTAL NUCLEAR SYSTEMS COST

Mr. THOMAS. What will this total program cost? When will you come up with something?

Mr. FINGER. This is the development of a whole new area.

Mr. THOMAS. How much did you start on it altogether? Did you start on this in 1958 or 1959?

Mr. FINGER. The first contract expenditures on the rocket were made in fiscal year 1959. The total expenditures through fiscal year 1961 on contract, including construction, are about $20 million. With respect to the total NASA share, through fiscal year 1967 it will be in the neighborhood of $750 million. Part of this is for the development of the first nuclear rocket engine and the first nuclear rocket stage.

Mr. THOMAS. That is what it is all pointed toward, is it not?

Mr. FINGER. Yes, sir.

Mr. THOMAS. How far along are you now in your advanced research, looking toward coming up with an engine or booster?

Mr. FINGER. The major part of our advanced research to date is directed at reactor development, the development of a nuclear rocket reactor. The largest part of that funding is within the AEC. The AEC has advanced research funds of about $75 million for that.

ADVANCED NUCLEAR TECHNICAL DEVELOPMENT

Mr. THOMAS. Turn over to A–6. Let's take a look at your technical development. You request $73,600,000 against $43 million last year against $20 million year before last. You have more than $70 million tied up in this program to date. You have around $225 or $230 million tied in it including your 1963 appropriation.

Mr. FINGER. Including 1963 and 1962.

Mr. THOMAS. You think you will have another half billion dollars tied up in it before you come up with something?

Mr. FINGER. Yes, sir. The number I quoted earlier was through fiscal year 1961.

Mr. THOMAS. How does this program fit in with the program we have been carrying on out in Dr. Abe's section with General Electric?

Mr. FINGER. This is different.

Mr. THOMAS. You have spent about a billion dollars on it in AEC and Navy.

Mr. FINGER. These are different, they are rocket systems.

Mr. THOMAS. Aren't the principles fundamental to all of them?

Mr. FINGER. The reactor technology is applicable. We are operating here at much higher temperatures than any of those systems and with a different coolant passing through the reactor. We are using liquid hydrogen as the coolant and neither of those systems use that.

Mr. THOMAS. Your reactor test support, $5.5 million rocket engine development, $36 million, system and components technology, $7.8 million, propellants, $12.5 million. Then your power generation is another $12 million. How do you arrive at these figures?

Mr. FINGER. Most of this work is contract work. For example, the reactor test support is contract work at Rockedyne to provide development of pumps and nozzles.

Mr. THOMAS. Your research is not all inhouse. You have a lot of contractors in that.

Mr. FINGER. Yes. We went through that on page 21–2.

Mr. THOMAS. What part of your advance research now is inhouse and what part is by contract?

Mr. FINGER. The largest part of the advance research is inhouse.

Mr. THOMAS. What do you mean the largest part?

Mr. FINGER. There is a $15 million item on advanced rocket research, and $10 to $12 million is inhouse.

CONTRACTORS FOR NUCLEAR DEVELOPMENT

Mr. THOMAS. You have nuclear rocket engine development, $36 million. Who are the contractors?

Mr. FINGER. Aerojet General and Westinghouse. Aerojet General is in Sacramento and Arizona, Westinghouse is in Pittsburgh. In addition they have other subcontractors; Bendix, and AMF.

Mr. THOMAS. How about the test support? Who does that for $5,500,000?

Mr. FINGER. Rocketdyne Division of North American is providing pumps and turbines which will be used by the AEC for reactor tests.

Mr. THOMAS. Systems and components technology, $7.8 million.

Mr. FINGER. Part of that is done in-house at Lewis. This is component work at Lewis specifically directed at nuclear rocket systems. Approximately $4 million is in-house in this area.

HYDROGEN PURCHASES

Mr. THOMAS. $12.5 million is set out for propellants.

Mr. FINGER. That is for the purchase of hydrogen to be used in the test program; both in the development of nonnuclear components and also for testing reactors at Nevada.

Mr. THOMAS. If your hydrogen costs $12 million, how much do you transfer to AEC?

Mr. FINGER. We provide hydrogen for all of this program, even the hydrogen used by the AEC.

Mr. THOMAS. What does it cost you a pound?

Mr. FINGER. It depends on where it is shipped from. If it is shipped from the west coast, it is about 60 cents a pound. If for some reason we have to ship it from the east coast, West Palm Beach, it is about $1.60 a pound. There are times, or there have been times, when the west coast plant was out of commission and we shipped from the east coast.

Mr. THOMAS. You are going to use the Nevada Proving Ground?

Mr. FINGER. A large part of it is used in Nevada. In addition it is used for development of all of these components and engines, not only in Nevada.

Mr. THOMAS. In other words, you need this fuel long before you have your engine in operation.

Mr. FINGER. Yes, sir. It is an essential part of the development. You cannot do development without it.

Mr. THOMAS. You will have to have pipes and other equipment?

Mr. FINGER. Yes, sir.

RESEARCH DONE BY ATOMIC ENERGY COMMISSION

Mr. JONAS. Wasn't the AEC equipped with laboratories? Couldn't they have done all of this research?

Mr. FINGER. They are doing the work that their laboratories are equipped to do, specifically the reactor part.

Mr. JONAS. Wouldn't it have been easier to expand their laboratories and let them do all of it instead of setting up a completely new system by NASA?

Mr. FINGER. This work does not involve setting up a new system. It is important to recognize that much of the hydrogen engine technology that is being used in the CENTAUR program, the Advanced SATURN, et cetera, applies directly to the work here. That is, the development of turbines and pumps from the chemical rocket engines apply information directly to the development of turbines and pumps in this program. We add, here, the effect of radiation from the reactor, but the Lewis Research Center is familiar with hydrogen technology. They are, therefore, best equipped to do this.

Mr. THOMAS. The answer to Mr. Jonas' question is, "No."

Dr. DRYDEN. The AEC does not have competence in the field of turbines and pump development.

Mr. JONAS. You did not have anybody in NASA until you brought them in.

Dr. SEAMANS. Here he is, right here, Dr. Silverstein.

Dr. SILVERSTEIN. We have carried into this field the competence that was built up over some 20 years in working with turbines and compressors for gas turbine engines and other engines in the past. This is a direct carryover of that whole technology into this new field. We are dealing with a new fluid, but the dynamics of the fluid flow and the mechanics of the systems are the same. This gives us a tremendous edge in the development.

Mr. JONAS. I thought you said the AEC was doing part of it.

Mr. FINGER. They are doing the nuclear reactor portion. The AEC has in fact come into the NASA installations to get background information on the hydrogen technology.

CONTRACTORS FOR ROCKET DEVELOPMENT

Mr. THOMAS. Who did you say the contractors were on developing your rocket?

Dr. DRYDEN. Aerojet and Westinghouse.

Mr. THOMAS. Two of them?

Mr. FINGER. Aerojet is the prime contractor, Westinghouse is the principal subcontractor.

Mr. THOMAS. Where is Aerojet located?

Mr. FINGER. Their headquarters are in Azusa, Calif.; Westinghouse is in Pittsburgh, and in addition I mentioned Bendix and AMF as subcontractors for this program.

SNAP-8 PROGRAM

Mr. THOMAS. What about this SNAP-8 program now?

Mr. FINGER. This is the first system, nuclear electric power system, that would provide large amounts of electric power, 30- to 60-kilo-

watts. It would also provide primary power for early electric propulsion which Dr. Silverstein discussed.

Mr. THOMAS. Is this Dr. Silverstein's program?

Mr. FINGER. SNAP-8 is a contract job, but the Lewis Research Center is assigned the managerial responsibility to technically direct the contract.

Mr. THOMAS. Who are the contractors?

Mr. FINGER. Aerojet General is the NASA contractor on the NASA portion of the job, Atomics International is the AEC contractor on the reactor.

Mr. THOMAS. What does Aerojet General have that Dr. Abe doesn't have? He has all the equipment and manpower. Why can't he do this instead of going outside?

Mr. FINGER. This is a hardware development job.

Mr. THOMAS. Do you know a better gadget man than Dr. Abe?

Mr. FINGER. No, sir. That is why he has the technical direction of that contract, in order to work with the contractors.

Mr. THOMAS. What do those people have that you do not have, Dr. Silverstein?

Dr. SILVERSTEIN. We fundamentally, as you know, are not in the business of building hardware. We are an R. & D. group. We do the basic research and then we contract for hardware with industry. Of course, we follow the work they do so that the money we spend with them will be appropriately spent.

Mr. THOMAS. I thought those people were airplane builders.

Dr. SILVERSTEIN. Aerojet, of course, has been one of the basic rocket organizations, one of the earliest rocket people in the business in the country.

Mr. THOMAS. You have already spent $220 million. It will cost the taxpayers about $750 million before you are through. When will you wrap it up? What are your hopes and aspirations?

Mr. FINGER. The $750 million I mentioned was for the nuclear rocket portion of the program. As we start new systems there will, in addition, be funds on the electric power generation program, probably eventually in a like amount. This is a new technology. I think it will continue for some years. We will start developing newer systems that will let us go further and further out into space. This is essentially the system——

Mr. THOMAS. How much do you have now for your electric development? This will cost you as much as your engine. Where is that set out?

Mr. FINGER. The power generation area is called out separately in each of these advanced research, advanced technical development, and flight program areas.

Mr. THOMAS. You have in round figures here about $12 million for that.

Mr. FINGER. Yes, sir.

Mr. THOMAS. That is Dr. Abe's activity too.

Mr. FINGER. Those funds are almost entirely contract dollars. The $7 million is for the Aerojet General Co.

Mr. THOMAS. This comes under the jurisdiction of the laboratory at Cleveland?

Mr. FINGER. Yes, sir.

Mr. THOMAS. Is any of this in-house work, Dr. Silverstein?

Dr. SILVERSTEIN. Not that which you are discussing here now.

Mr. THOMAS. How much money do you eventually think you will have to spend on this power generation?

SCHEDULE FOR SNAP–8 PROGRAM

Dr. SILVERSTEIN. The program now for the SNAP-8 development power calls for a first flight test in 1966, and we will be requiring funds in the ensuing years for boosters actually to carry these propulsion systems into space. After 1966 there will be funding to complete development and about 1970, I would guess——

Mr. THOMAS. Is this solar program a part of the SNAP-8?

Dr. SILVERSEIN. The solar program is not part of SNAP-8. It was covered earlier.

Mr. THOMAS. And neither is the ion program a part of SNAP-8?

Mr. FINGER. No, sir.

NATURE AND COST OF SNAP–8 PROGRAM

Dr. SILVERSTEIN. SNAP–8 is the power source. As you recall, I discussed a system which had a power source, a conversion process and the electric engines. All these together make a system. This is the one end of the system, the power source and the other end of the system is actually the engine itself, or the thing that accelerates the ions that make the thrust, so that this is two ends of the program.

Mr. THOMAS. And the SNAP–8 is what part of the program now?

Dr. SILVERSTEIN. That is the power end, the power generation end.

Mr. FINGER. That part has to be tied to the ion propulsion to produce an electric propulsion system, an electric rocket.

Mr. THOMAS. You cannot separate them. They all tie in together. When you perfect this, the probabilities are it will cost you as much as your reactor then.

Mr. FINGER. Yes, sir. We expect that the SNAP–8 system itself will.

Mr. THOMAS. How much is your nuclear rocket? You have a program here that will cost in excess of a billion dollars, before you get through with it.

Mr. FINGER. The SNAP–8, the NASA portion, will cost about $40 million. We will have to develop higher power systems and as indicated here there is an item for a megawatt system design study. Electric propulsion requires many megawatts of electric power.

The SNAP–8 will only provide 30 to 60 kilowatts.

Mr. THOMAS. Thank you, gentlemen.

AIRCRAFT AND MISSILE TECHNOLOGY

Mr. THOMAS. Let's take a look at "Aircraft and missile technology." Mr. Reporter, put pages RDO 22–1, 22–2, and 22–3, the tables on 22–11 and 22–12 and the narrative on the X–15 and supersonic commercial transport research.

(The material referred to follows:)

AIRCRAFT AND MISSILE TECHNOLOGY

Summary of requirements

	1961	1962	1963
Advanced research	$22,000,000	$24,000,000	$30,000,000
Advanced technical development	8,000,000	9,000,000	9,500,000
Flight programs	7,857,000	8,479,000	13,088,000
Total	37,857,000	41,479,000	52,588,000

OBJECTIVES

To generate the technology for the design, construction, and operation of advanced aeronautical vehicles and missiles to support current and projected civil and military requirements and to maintain U.S. leadership in these fields.

JUSTIFICATION

NASA's aircraft and missile technology program generates data which are used extensively in the following areas:

1. On June 28, 1961, a national program was initiated by the Federal Aviation Agency, Department of Defense, and the NASA toward the development of an economically competitive supersonic commercial air transport. NASA's role is to produce the advanced research information necessary for the project. The major goals of the program are the attainment of the capability to compete economically with the long-range subsonic transport of the 1970's, public acceptability with regard to such factors as noise and sonic boom, satisfactory safety and reliability characteristics, and the maintenance of U.S. leadership in aeronautics. In addition, the design must be capable of future performance growth in terms of range, payload, speed, and economy of operation to protect the Nation's investment.

2. Several types of short takeoff and landing (STOL) or vertical takeoff and landing (VTOL) aircraft are under consideration in the civil transport field, following extensive NASA research efforts. Among these are an airplane intended to operate in underdeveloped territory in advance of road and rail systems, a feeder transport capable of operating efficiently from small fields and of making use of the relatively free connecting strips perpendicular to the main airport runways; and a long-range STOL transport capable of competing with the present transports on moderate length intercity routes by virtue of its ability to operate from relatively small airports located close to the centers of cities. The first two types of aircraft have military counterparts with full vertical takeoff (VTO) capability in the U.S. short-range Tri-Service transport and the NATO medium-range transport. In the case of helicopters, NASA's research work is directed toward determining ways of attaining all-weather capability, increased ferry range, increased component life, improved flying qualities, reduced noise, and reduced complexity.

3. For several years, NASA has concentrated on a continuing program to develop the means for providing true multimission combat aircraft, thus reducing the number of types necessary to meet military requirements. As a result, a variable sweptwing tactical aircraft, known as the TFX, is now in the initial stages of procurement by the Department of Defense. This unique aircraft is a two-man, twin-engine, fighter-bomber designed principally for the medium-range strike and reconnaissance roles of the Tactical Air Command. It has extensive capability also as an air-to-air interceptor for close air support, and as a Navy combat air-patrol or strike airplane. In addition, the Navy and Army currently have under study a second close-support multimission aircraft, known as VAX or ASCAS (all-service close air support). The performance requirements for this airplane have not yet been finally determined, but are expected to follow those of the TFX airplane in general, except that the gross weight will be about half that of the TFX and it will have more stringent requirements for short takeoff and landing performance.

4. The potential of hypersonic aircraft has generated much interest in the Department of Defense. The DYNA-SOAR project in particular demands advances in the state of the art in the areas of propulsion, hypersonic aerodynamics, structures, and materials. The X–15 flight research program, the DYNA-SOAR development program, and various reentry vehicle programs are providing some of the required information. Further work will be conducted in this area in fiscal year 1963. NASA has also conducted numerous studies of recoverable boosters in an effort to make the space program as economical as possible. One method studied is the possibility of a manned hypersonic aircraft to replace the firststage booster of a launch vehicle to carry the payload and upper stage rockets to a high-altitude, high-velocity conditions before they are launched. This method might be economically attractive provided the aircraft is capable of a sufficiently high velocity and there are a large number of relatively small spacecraft to be launched. The aircraft would also possess the advantage of being self-ferrying to desirable launch points and of providing the very important capability of offset launch.

5. Advanced technical development to support both military and civil aircraft procurement is continually conducted in the NASA research centers. This work is performed in cooperation with Government-sponsored contractors at the request of the cognizant Government agencies when in the national interest.

6. NASA will also continue to conduct in fiscal year 1963 advanced technical development in support of missile programs of the Department of Defense. In the case of maneuverable missiles, the work includes the aerodynamic stability and control aspects and critical navigation and guidance component development.

FUNDING REQUIREMENTS

Advanced research

	1961	1962	1963
Supersonic commercial transport:			
Aerodynamics	$10,200,000	$10,300,000	$11,000,000
Propulsion	2,500,000	3,500,000	4,000,000
Structures and materials	2,000,000	1,500,000	2,000,000
Operating improvements	500,000	700,000	1,000,000
Subtotal, supersonic transport	15,200,000	16,000,000	18,000,000
V/STOL [1] aircraft:			
Aerodynamics	1,700,000	1,500,000	1,500,000
Propulsion	100,000	500,000	1,000,000
Structures and materials	300,000	500,000	1,000,000
Operating improvements	200,000	500,000	1,000,000
Subtotal, V/STOL [1] aircraft	2,300,000	3,000,000	4,500,000
Multicapability aircraft:			
Aerodynamics	3,000,000	2,500,000	2,500,000
Structures and materials	300,000	300,000	1,000,000
Operating improvements	200,000	200,000	1,000,000
Subtotal, multicapability aircraft	3,500,000	3,000,000	4,500,000
Hypersonic aircraft:			
Aerodynamics	450,000	1,000,000	1,000,000
Propulsion	350,000	600,000	1,000,000
Structures and materials	200,000	400,000	1,000,000
Subtotal, hypersonic aircraft	1,000,000	2,000,000	3,000,000
Total, advanced research	22,000,000	24,000,000	30,000,000

[1] Vertical and short takeoff and landing.

SUPERSONIC COMMERCIAL TRANSPORT

Aerodynamics

An intensive aerodynamic research effort to establish the technical feasibility of an economically competitive, high-performance, supersonic commercial transport and to identify critical problem areas for further detailed investigation has been underway by NASA since fiscal year 1960. The results have played a major role in the inception of the current program of Government assistance toward the timely development of a suitable prototype.

Although broad technical feasibility has been satisfactorily demonstrated, the research has shown that an aerodynamic configuration to satisfy the stringent requirements of the airlines and the public has not yet been fully achieved, and the technology to arrive at an optimum solution for the U.S. needs is not yet available to the aircraft industry. The NASA effort during fiscal year 1963 must, therefore, be substantially increased. Critical areas for the enlarged effort include theoretical and experimental studies of ways to improve flight efficiency, dynamic stability, and handling qualities throughout the wide speed range implicit in the complex transport mission; accumulation of additional basic data for predicting the characterstics of alternate design solutions before the prototype is frozen; and further application of high-lift devices and speed brakes to the preferred aerodynamic configurations in order to maintain current takeoff and landing speeds on present runways.

Propulsion

Extensive research information on air-breathing engines is available; however, because of problems peculiar to the development of a suitable propulsion system for the supersonic transport, additional research is necessary.

Studies have been initiated, and will be continued in fiscal year 1963, to determine the optimum type of engine for a supersonic transport aircraft, its required design features and mode of operation. In these analyses, each class of engine cycle will be mated to representative airframe configurations and the cycle design and operating variables (e.g., pressure ratios, temperatures, bypass ratios, match lines) as well as the flight profile will be varied in order to ascertain the most favorable design conditions. Of particular importance is the off-design performance of compressors, turbines, fans, and burners, the satisfactory matching of these components throughout the operating range, and avoidance of operating limits such as rotating stall and engine surge. The inlet, exit, noise suppressor, and thrust reverser performance must be examined, and the weights of the propulsion system components must be determined accurately by preliminary design procedures.

Continuing research over the past several years has furnished information on the design principles of aircraft inlets capable of satisfactory operation at one specific mach number; however, these principles have not been combined into an inlet design which is matched to the particular airflow requirements of the propulsion system needed for a supersonic transport. Also, the performance of such an induction system operating off design, through a range of angles of attack and sideslip, cannot be analyzed adequately by simulation and must, therefore, be determined experimentally. Another inlet problem which is known in principle, but which must be determined experimentally for particular designs, is the area of inlet controls, sensor location, and sensor type. Research to be initiated in fiscal year 1963 in this direction will embrace all operating variables, such as inlet geometry changes, mach number, altitude, and airframe interactions.

Another investigation to be undertaken in fiscal year 1963 is the exploration of fuels available for use in a supersonic transport. The concentration of non-hydrocarbon components in fuel introduces problems of thermal instability that will become severe in a mach 3 transport where aerodynamic heating may expose the fuel to moderately high temperatures for very much longer periods of time than those currently encountered. Small amounts of solids from the trace impurities in petroleum-derived fuels can clog nozzles, and foul fuel controls. Analyses and investigations will be conducted in fiscal year 1963 to obtain a typical time-temperature history of fuels in supersonic commercial transport operation. Work will also be done to determine the degradation of fuel which can be expected under operating conditions, the effect of this degradation on engine and airframe overhaul life, and the relative benefits to be obtained through the upgrading of these fuels.

Structures and materials

Minimum structural weight is imperative to the development of an efficient, reliable supersonic transport. The aircraft structure must have the capability of withstanding the loads, temperatures and acoustic environment over the 10–15 year lifetime of the airplane. This more severe environment must be withstood with no increase in the percentage of structural weight compared to present-day subsonic aircraft.

Over the past several years the amount of structural research applicable to aircraft has been declining. Research aimed at problems of structural design has shown a marked decrease, and research aimed at flutter and other dynamic problems has been continued at a lower level of effort than previously. The feasibility of the supersonic transport has given impetus to new structural research, in particular research relating to structural materials.

Of primary importance is an increased knowledge of the basic properties of the materials of which supersonic transport is to be constructed. Research initiated in fiscal year 1962 on temperature range and long material lifetime will be expanded in fiscal year 1963. An experimental and analytical program is required to provide means of predicting the stress corrosion of materials under consideration for both steady-state and fatigue loads in atmospheres that may be contaminated with sea salt and other contaminants. In addition, a program will be initiated to evaluate the effects of fusion and resistance welds or other fastening methods on the parent metal properties under time, temperature, fatigue and corrosive environment.

Also urgently needed is an evaluation of the properties of nonmetallic components of the airplane which must also withstand the environment of supersonic flight. A compilation of data and sponsorship of necessary research programs for other materials for items such as tires, bearings, windows, seals, insulation, hydraulics is projected for fiscal year 1963.

Equally important is the efficient utilization of these materials to derive optimum structural designs. Studies and tests of types of structures to find optimum parameters for wings and fuselage construction using steel and titanium for the structural indexes and structural rigidity requirements are planned. These will include tests of specimens and segments of components up to full size including fabrication techniques under test conditions of time, temperature, and loading cycles which simulate the supersonic flight time history.

Operating improvements

Fiscal year 1962 and prior year funds provided for research in supersonic aircraft operating problems which are directly related to the supersonic commercial transports are:

(*a*) Studies of runway requirements and the response of aircraft configurations to runway roughness.

(*b*) Studies of atmospheric turbulence at altitudes up to 100,000 feet.

(*c*) Generalized studies in the fields of air traffic control, communications and meteorology.

(*d*) Studies of sonic booms using wind tunnel and flight investigations.

(*e*) Studies of landing approach techniques using simulator and flight experiments.

(*f*) Studies of handling qualities of various aircraft configurations using simulator derived data.

The fiscal year 1963 request provides for continuing work in these areas. In the past 2 years, these research efforts have provided much of the basic information required for the development of a supersonic commercial transport. The research in sonic boom problems has indicated the need and direction for further research. Past research efforts which have required the use of simulators have been handicapped by the lack of proper facilities such as the five degrees of freedom simulator at the Ames Research Center which began operations in the fall of 1961 and the simulator planned for the Langley Research Center. Fiscal year 1963 funds requested will also be used to support the major research efforts required in such operating problem areas for the supersonic transport as sonic boom, information display systems and air traffic control. The results of the research effort on these problems will have a direct influence upon aircraft configuration. The mission profile of the supersonic transport and the combination of airframe and powerplant characteristics required to fly the mission profile are directly dependent upon the solution of the sonic boom problem. Research will be directed with fiscal year 1963 funds toward further flight tests using various supersonic aircraft and specialized wind tunnel tests to determine both the effect of total lift and aerodynamic design on sonic boom intensity. An extended flight test program will be undertaken to ascertain the effects of changing meteorological conditions on boom propagation.

Simulator facilities, both existing and planned for the Ames and Langley Research Centers, will be the principal research tools used to study the problems associated with information display. Simulators will permit the economical and simultaneous study of variable aircraft characteristics, flight situations and

navigational problems with the pilot in the simulator with the goal of optimizing information display system for the extremely demanding task of supersonic commercial aircraft operation.

Air traffic control presents a severe problem today and the problem will be magnified as speeds and volume of air traffic increase. A systems analysis approach which considers both the aircraft and the ground control system will be studied in fiscal year 1963. Research in this area will tie together aircraft simulators, computing facilities and air traffic control simulators for study of the resultant situations.

Advanced technical development

	1961	1962	1963
Missile technology	$1,000,000	$1,000,000	$1,000,000
Hypersonic aircraft	1,700,000	2,500,000	2,500,000
Military and civil aircraft support	5,300,000	5,500,000	6,000,000
Total, advanced technical development	8,000,000	9,000,000	9,500,000

Flight programs

	1961	1962	1963
B–58 flight simulation of supersonic transport operation	$100,000	$500,000	$1,600,000
B–70 flight simulation of supersonic transport operation		200,000	1,500,000
X–15 hypersonic environment studies	7,000,000	7,000,000	8,000,000
V/STOL aircraft	757,000	779,000	1,988,000
Total, flight programs	7,857,000	8,479,000	13,088,000

X–15 program

The three X–15 research airplanes were developed to explore the hypersonic flight environment and to obtain fundamental research information under realistic flight conditions pertinent to the problems of hypersonic flight. The X–15 research airplane program consists of studies in the research areas of vehicle performance, aerodynamics, heating, flight control and control systems, and physiological phenomena. During fiscal year 1963, this program will be continued to explore the flight conditions at higher altitudes, possibly as high as 90 miles and at speeds up to 4,000 miles per hour. The exceptional performance of the X–15 airplane, particularly with regard to its altitude capability, makes it a valuable test vehicle for many useful experiments. Some of the experiments planned in fiscal year 1963 for inclusion in this program include ultraviolet stellar photography, horizon definition, infrared exhaust signature, and a landing computer.

Mr. THOMAS. We have one of our friends here from Langley. Welcome aboard, Mr. Stack. Are we still in the airplane business? I thought we were out of that. Here we have $52.5 million.

Does this include the maintenance and operation of Edwards Air Force Base?

Mr. STACK. Yes, insofar as the NASA Flight Research Center at Edwards is concerned.

Mr. THOMAS. Advance research, $30 million; advance technical development, $9.5 million; flight programs, $13,088,000; a total of $52.5 million against $41.4 million in 1962, and $37.8 million in 1961.

Now we are up to the X–15 airplane. When will we get out of the airplane business?

Dr. SEAMANS. I do not think we will get out of it for a long time. I think they are pretty useful.

Mr. THOMAS. Mr. Stack, we have been missing you. How long has it been?

Mr. STACK. Eleven years.

NASA COOPERATION WITH FAA IN SUPERSONIC AIRCRAFT DEVELOPMENT

Mr. Halaby is requesting $25 million in FAA. Mr. Halaby's effort is in the general area of reducing, or accelerating the reduction of, some of these research results to practicality. He in general is more in the applied area in a program of assistance to U.S. industry.

Mr. THOMAS. Mr. Stack, if you do not take each other over, why do you not merge?

Mr. STACK. I do not know what you mean by "merge," but we have a pretty active joint effort in the business of taking our advanced work and getting it reduced through Mr. Halaby's effort, and through the aid of industry and Mr. Halaby's support of industry to engineering practicality.

Mr. JONAS. Did you mean to say "support of industry." That is what I have been afraid of in this whole operation.

Dr. SEAMANS. Wind tunnel work, model testing, that type of work, which the NACA did for many years before NASA was formed.

Mr. JONAS. I thought he might want to change that phrase, "supporting industry."

Mr. WEBB. I think it is a good idea to make that change.

What we are doing is working in very advanced research areas here where the work we do in missiles and the work we do with aircraft should lead on to better aircraft, both military and civil.

Industry has to actually build the airplanes. In this field, NASA is a research organization completely. We have no operating responsibilities. The FAA and other agencies of the Government have some of the same responsibilities with aeronautics that we have in the space field where we are an operating agency. In this way, industry does come in to utilize research for the particular needs they build airplanes to fill.

I think this is what we use the word "support" to mean.

Let me say one more word.

INTERNATIONAL COMPETITION FOR SUPERSONIC TRANSPORT MARKET

I have had some talks with Mr. Halaby about this whole problem. Of course, the United States has been preeminent in this field of aviation. We are very anxious we not lose this position. Our work on the supersonic transport is one of the areas that has to be considered in the light of a predominant world leadership position.

Mr. THOMAS. What was the figure Mr. Halaby used in here, a $3 or $4 billion market?

Mr. WEBB. The figures used are for a potential $3 to $4 billion market.

Mr. THOMAS. Why cannot industry carry this load? Suppose it is a half billion. Cannot industry carry this load?

Mr. STACK. May I say a word on this?

The aircraft industry, as for example in our present jets, carried a large part of this load, but it was carried because at the same time they had a lot of work in their factories, which kind of work they do not have in their factories now.

Mr. THOMAS. The taxpayers support all the airplane factories, we own the property, tools, and everything else.

Mr. STACK. Yes. They do not have this liquid position to undertake it. What we are faced with in this business of the commercial aircraft is a competitive situation as it relates to the British-French effort, with the French Government running essentially a nationalized industry. They have already set up some money to finance and the British and French Governments are negotiating at the present time a joint effort in this business.

Mr. THOMAS. And the Russians are threatening?

Mr. STACK. I think there is less threat perhaps from the Russians, but the British and French will build aircraft that can go on the world's commercial airways and can meet our safety standards.

Prior to the jet air transport situation, roughly 93 percent of the world transports were of American manufacture, and American aircraft export at that time amounted to about one-eighth of our total manufactured export. Since the turbine engine situation has come in, we have nowhere near that favorable a position. If we do not match them with the vehicles, we will be buying foreign commercial supersonic transports in the 1970 period.

Mr. THOMAS. We are familiar with that good historical background. It is always helpful for the record.

SUPERSONIC AIRCRAFT RESEARCH

How much money are we going to spend this year? You have been working on this to my certain knowledge for 10 or 11 years. How much money, would you say, including your $30 million you are looking for this year, have we put in on this?

Mr. STACK. The supersonic transport?

Mr. THOMAS. From your X–1 through your X–15. We have not gotten anyplace yet.

Mr. WEBB. A lot of this work has gone to military aircraft. You cannot charge this all against the supersonic aircraft. It is from the total pool we take the work for the supersonic transport.

Mr. THOMAS. We have spent about a billion dollars here on the B–70, or the RS–1. You have many overlapping problems here. You have a different configuration in your fuselage and your engines on which you have picked up a world of information.

Mr. WEBB. That is right.

The work called for by the funds requested in this budget is to keep the tools of research and the personnel capable of using the tools for military, or civilian, or any other aeronautical uses the Nation has.

Mr. THOMAS. Where is this work done? Is it all done at Langley?

Mr. STACK. No.

Dr. SEAMANS. Langley, Lewis, and the Flight Research Center.

Mr. THOMAS. You do not do any research at Edwards there outside of testing?

Mr. WEBB. On the X–15, results come back.

Mr. THOMAS. This is scattered over our old line laboratories?

Mr. STACK. Yes.

Mr. THOMAS. What is going to be the ultimate cost? You have advanced research, advance technological development, flight programs, call them whatever you may.

FAA got $10 million last year. The Air Force more than likely will have some money involved in this. Here we have $52 million in for research alone.

Mr. EVINS. Did we not appropriate $75 million for a nuclear-powered ship a few years ago and then abandoned it?

Mr. THOMAS. More than that.

What is your opinion, Mr. Stack? What is it going to cost?

Mr. STACK. We need the $52.8 million.

COMPLETION DATE

Mr. THOMAS. How long will it be before you will have something in the air?

Mr. STACK. Supersonic transport?

Mr. THOMAS. Yes.

Mr. STACK. It probably should fly under present programs along about 1966 or 1967.

Mr. THOMAS. Four years off.

Any contracts let for prototype development yet?

Mr. STACK. No, sir. This is because the approaches have not been clearly enough defined

FUTURE FUNDING REQUIREMENTS

Mr. THOMAS. Will this $52 million wrap up your research and development, or will you have to have more money?

Mr. STACK. We will need more money next year.

Mr. THOMAS. How much, and for how much longer?

Mr. STACK. There will probably be some funds in this over the next 4 or 5 years.

Mr. THOMAS. How much?

Mr. STACK. Depending on the degree of success we have with this year's fund will determine what we will have to ask for next year.

SCHEDULE FOR DEVELOPMENT

Mr. THOMAS. When are you going to get through with your research and development and get something on the board here so you can construct a prototype?

Mr. STACK. It is hoped after fiscal year 1963, toward the end of fiscal year 1963, we can get down to configurations that will meet the commercial seat-mile costs, and will have the necessary flexibility and utility so they can be used on short legs at high subsonic speeds as well as do the long legs at supersonic speeds.

The aim of this work is to try to develop the technology so that we essentially have both types in the fleet.

Mr. THOMAS. When and how much? What is your best guess?

Mr. STACK. The best guess is, we should be in a position to start talking about a logical prototype that will meet commercial seat-mile cost and to lay down some definite forms with some reasonable proof at the end of fiscal year 1963.

COST OF PROTOTYPE

Mr. THOMAS. What is a good wrap-up figure?

Mr. STACK. For what?

Mr. THOMAS. To get something in the air.

Mr. STACK. It will take until 1966 or early 1967 before anything gets into certification.

Mr. THOMAS. What will be your total cost? Break it down into R. & D. and the prototype itself. Give us a wild guess and tame it down later.

Mr. STACK. The total over that period, we are talking about probably triple what is in here. That is a horseback figure.

FAA AND NASA SUPERSONIC TRANSPORT PROGRAMS

Mr. JONAS. Mr. Webb, if you were sitting on this side of the table, a man of business judgment—and I have great respect for your ability and your knowledge in this field—would you vote to give you people $52 million and FAA $25 million to do the same thing?

Mr. WEBB. It is not the same thing, Mr. Jonas.

Mr. JONAS. Yes, it is.

Mr. WEBB. No, sir.

Mr. JONAS. It is working toward the same objective.

Mr. WEBB. It is for the same objective, but in this budget $18 million is allocated out of the advanced research for the supersonic commercial transport.

Now we also have in that program the work on the vertical and short takeoff landing aircraft. That is one of the major problems in the development of an efficient transportation system for this country—relating our cities to central airports and the intercity transport. Here in the multicapability aircraft field, we have another $4.5 million. In the hypersonic aircraft, $3 million.

Such basic concepts as the TFX have come right out of these laboratories because the tools and the men for research are there. This is essential in my view for the future superiority of the United States in the field of aviation.

Mr. JONAS. That is exactly what Mr. Halaby told us.

Dr. SEAMANS. Mr. Halaby does not have laboratories with wind tunnels.

Mr. JONAS. What will he do with his $25 million?

Dr. SEAMANS. Go out on contract.

Mr. WYATT. In this sum of $52 million, only about $5 million, or a little less, is for contract, the rest is to support in-house activities.

Mr. JONAS. That does not change the picture at all. I know FAA is not going to build a laboraatory and do this research. They are going to contract it out, but if you are equipped to do the work, why can he not contract with you?

Dr. SEAMANS. In effect, he is contracting part of the program with us through John Stack. They have a coordinated program.

Mr. JONAS. How much is proposed of his $25 million to be spent with you?

Dr. SEAMANS. The funds are appropriated directly to us. Ninety percent of the effort we are talking about will be done inhouse by the NASA.

Mr. WEBB. There is a basic difference between what Halaby must do to carry out his function, and this kind of research functioning. There is a basic difference.

Mr. JONAS. Correct me if I am wrong. Did not Mr. Halaby justify that program to us on the basis we had to keep pace with the developments of the rest of the world, and if we did not come up with a supersonic commercial plane in this decade, we would be bringing up the rear of the procession? That is exactly what you are saying.

Mr. WEBB. That is exactly right.

Mr. THOMAS. Off the record.

(Off the record.)

Mr. JONAS. I am not arguing that you are not better qualified to do the work than he. You have the laboratories and the engineers and the scientists. I am unconvinced so far that there is not duplication. That is what I want to stop. Maybe we can knock out his money and let you go on with this. I do not think we can afford to do both.

PROBLEMS IN SUPERSONIC TRANSPORT DEVELOPMENT

Mr. WEBB. I think the problem here is one of relating how the aircraft industry has picked up and used the findings of research which you have supported in this committee over the years, and moved forward. This technical problem has become so much more complex than it used to be that in a sense the suggestion as to how to use the research now comes out of those people in organizations like ours who do the research much more so than heretofore.

Previously, the military organizations would move forward with large aircraft based on the foundation of research done in NACA. You would see a commercial development follow those efforts by the military to build these large types.

I think Mr. Halaby's concern is that the present state of knowledge within the industry, and the present difficulty of moving to a 2,000- or 3,000-mile-an-hour airplane, does not permit following this traditional pattern. FAA has to take some responsibility that was not heretofore required in his agency to get a supersonic transport. So he is in a sense pushing in the areas that heretofore his organization would not have pushed in under the traditional method of development.

EXCESSIVE NOISE

Mr. THOMAS. One of Mr. Halaby's immediate problems that the space people are not working on is the question of "noise." He said, if you were to take this B–70 engine as it is today, you could not use it in any civilian airport in the United States. It would blow everyone off the map and break every window within 3 to 5 miles. His problem is to reduce that noise, and he used the words "afterburner" and "foreburner" engine.

His problem, the one he is going to spend his money for, is entirely different from what you people are doing. You are purely in the field of configuration and aerodynamics, and his is a question of getting an engine that is not adapted to the military, but adapted exclusively to civilians. He said this military engine just will not work in a civilian plane.

In the first place, you cannot land on a civilian airport. It would ruin the neighborhood. You are not going to have 15,000 or 20,000 acres in which to land it.

Mr. WEBB. May I say another word? I think, Mr. Chairman, the situation with respect to many of these kinds of activities is that if you started on a development of a supersonic airplane now, to build one to fly, you would find undoubtedly problems would arise just as they did in the nuclear propulsion airplane field. The plain fact is, we are not yet ready to enter into a developmental series of aircraft hardware to fly.

There are certain very important things that need to be done first. They are being done here within these budget requests. If the requests were to proceed right away to development, the requests would be very much larger. I think the thing that would be most helpful to you would be to let Mr. Stack say a few things about the things that need to be developed.

Mr. STACK. Mr. Thomas treated the noise problem. At the present time, none of the available engines will let you take off with a low enough noise level to be acceptable, and would force you out of the regular commercial airports.

SONIC BOOM

Secondly, we have a boom problem if we are going to use commercial aircraft, the sonic boom problem. We have done a lot of work on it. We have a little more to do. We know that we are going to have to make this machine fly higher than 40,000 feet before it goes through the speed of sound. This means we have to have a supersonic airplane that has better subsonic characteristics than the jets we are flying today.

LANDING AND TAKEOFF SPEEDS

We have slush problems of ice and snow on runways. One way to help this is to get the landing speeds and takeoff speeds down below the values we have today. If we are going to operate, as is the intention, from our present airports with no further increase in runway length, or no further increase in concrete thickness on these runways, all of these numbers have to come down.

Mr. THOMAS. Let it go at that. That is very clear-cut.

RESPONSIBILITY FOR PROTOTYPE DEVELOPMENT

How much more money will you need for R. & D. before you are going to get ready to put money in a prototype. Will this be in your budget, Mr. Webb?

Mr. WEBB. No. Mr. Halaby, or someone else must be responsible for prototype development. We are the research people.

Mr. STACK. It is not contemplated in our view we should undertake that.

FAA AND NASA DEVELOPMENT RESPONSIBILITIES

Mr. JONAS. I would like to read something into the record. This comes from FAA's summary of budget estimates for 1963.

The $25 million requested in fiscal year 1963 will be used to continue research activities begun in fiscal year 1962 leading to the development of a commercial supersonic transport aircraft by U.S. industry. The research involves such work

as small specimen tests, generalized wind tunnel tests, engine cycle studies, and structural and aerodynamic load prediction techniques.

This 2-year program will determine whether the construction of a supersonic transport aircraft is technically and economically feasible, and will provide a basis for determining to what extent continued Government assistance will be required in its development.

Mr. WEBB. Some of that sounds very close to NASA's function. I agree. They ought to define a better line than those words indicate.

Mr. STACK. I would like to point out Mr. Halaby's words do not mean to the exclusion of the basic research. He says this is what he needs in addition to our basic research.

Mr. THOMAS. Dr. Seamans, can you add anything to this briefly. We want two sets of figures.

Dr. SEAMANS. On this matter of research and development, I certainly agree the real question is to the kind of research we are talking about in connection with the FAA's program, the basic work, for example, on structures, much is going on in the Lewis Center. There, we are testing a whole wide variety of small specimens to see how they will stand up at various temperatures and various stresses. As a result of that work, we have singled out a few materials which the FAA is going to take to industry on contract to have them investigate the difficulty of manufacturing these particular kinds of metals, to roll some out, and to make sample specimens of others.

Mr. THOMAS. That is very helpful. You have done the R. & D. for the last 5 years on the B–70. Why would not that work fit the bill for this particular type of plane?

Mr. WEBB. Because we expect them to go 1,000 miles an hour faster.

Mr. STACK. The B–70 is an airplane optimized around one particular mach number. The B–70 is a kind of "go," or "no go," airplane. It is designed for one particular mach number. The B–70 would not meet the varying approach requirements, or the landing speed requirements, and the noise requirements.

Mr. THOMAS. You have a better answer than that. You have a different configuration. You have a different engine. When you have said that, you have covered a multitude of sins.

Mr. STACK. It is a totally different problem, and it is the most unusual problem we have tackled in this aeronautical research business in all the years we have been in it.

TOTAL COST OF SUPERSONIC TRANSPORT DEVELOPMENT

Mr. THOMAS. How much more R. & D. are you going to have to have on this commercial supersonic plane, and when will you wrap it up?

No. 2, what is it going to cost you to get a bird in the air in addition to your R. & D., and when? What is your horseback opinion?

Mr. STACK. To wrap up the research on this, we are probably talking about a grand total of three times the figure we have in here before we are through. That is a horseback opinion.

Then to get a bird in the air, it takes more than a single bird in the air. It would necessarily be perhaps three birds to get all the flight certification experience and that sort of thing done.

I am not the expert to give you the figure on this because it depends on the quality of the research solution, and the degree the airlines and certain companies will be willing to risk their own money.

Mr. THOMAS. You said three times this figure. You mean it will take another $150 million in addition to what you have spent for research?

Mr. STACK. I was referring to the $18 million figure for the supersonic commercial transport. I am referring to page 22–3. I am refering to the $18 million that is listed under "Supersonic commercial transport" as three times, plus some flight work.

Mr. THOMAS. What is that total?

Mr. STACK. Let's say $70 million, roughly.

Mr. THOMAS. Does that include your funds and FAA's or both?

Mr. STACK. Those are our funds.

TRACKING AND DATA ACQUISITION

Mr. THOMAS. Let's take a look at tracking systems, $158 million. We will insert pages 23–1, 2, 8, 12, and 13.

(The pages referred to follow:)

TRACKING AND DATA ACQUISITION

Summary of requirements

	1961	1962	1963
Systems development	$11,512,000	$13,051,000	$15,950,000
Network operations	24,067,000	55,376,000	67,815,000
Equipment and components	8,751,000	26,417,000	74,645,000
Total	44,330,000	94,844,000	158,410,000

OBJECTIVES

To provide the tracking and data acquisition services required by NASA flight programs.

JUSTIFICATION

Every space flight mission, whether rocket development, scientific satellite, space probe, or manned spacecraft, is undertaken to gather information. The critical element in getting such information back to the managers of the mission is the worldwide network of tracking and data acquisition stations. These stations, linked together and to the NASA data centers by a communications net, received and record telemetered data, track the spacecraft in order to determine its position, and transmit command signals as required. Each flight mission has its own specific requirements for tracking accuracy, amount and kind of spacecraft-gathered information to be transmitted, command signals to be received, and location of ground instrumentation to perform these functions. The NASA networks, supplemented as required by cooperating stations, are a flexible and responsive tool used to fulfill the requirements of the flight missions.

FUNDING REQUIREMENTS

Systems developments

	1961	1962	1963
Improvement of existing systems and operations:			
Data acquisition	$1,029,000	$1,004,000	$1,503,000
Electronic tracking	867,000	761,000	794,000
Data processing	1,575,000	1,461,000	2,213,000
Spacecraft command	476,000	805,000	994,000
Antennas	1,138,000	2,419,000	2,493,000
Calibration	343,000	515,000	628,000
System testing	895,000	852,000	911,000
Subtotal	6,323,000	7,817,000	9,536,000
Subsystem development	783,000	1,050,000	1,111,000
New systems development:			
Data acquisition	1,225,000	1,165,000	1,194,000
Electronic tracking	564,000	668,000	975,000
Data processing	1,158,000	1,137,000	1,285,000
Spacecraft command	334,000	357,000	450,000
Optical	580,000	440,000	837,000
Timing	545,000	417,000	562,000
Subtotal	4,406,000	4,184,000	5,303,000
Total, systems development	11,512,000	13,051,000	15,950,000

One of the basic functions of tracking and data acquisition is to provide the necessary ground instrumentation support required by the NASA spaceflight program. As the number and complexity of the spacecraft planned for the following years has substantially increased, the capabilities of the ground instrumentation must be augmented by developing new systems and making improvements to existing systems and operations. In many instances, state-of-the-art subsystems and equipment are being developed for incorporation into the ground instrumentation to meet the more demanding requirements of the spacecraft missions in a technically and economically sound manner.

Network operations

	1961	1962	1963
Satellite network	$9,620,000	$11,441,000	$17,794,000
Deep space network	4,233,000	7,020,000	9,272,000
Manned space flight network	293,000	22,690,000	24,074,000
Network communications	6,915,000	12,290,000	13,234,000
Data processing	3,006,000	1,935,000	3,468,000
Total, network operations	24,067,000	55,376,000	67,815,000

Equipment and components

	1961	1962	1963
Satellite network:			
Maintenance, spares, and replacement	$3,622,000	$2,765,000	$6,778,000
Expansion of network capability:			
Antenna	2,366,000		4,674,000
Receiving and recording	1,358,000	951,000	3,168,000
Command		618,000	2,175,000
Data handling and processing		166,000	1,654,000
Tracking			1,781,000
Total	7,346,000	4,500,000	20,230,000
Manned flight network:			
Maintenance, spares, and replacement		3,260,000	3,269,000
Expansion of network capability:			
Augmentation of ground voice communications		3,803,000	
Automatic telemetry read-out equipment		2,445,000	
AN/FPS-16 radar equipment		2,988,000	
Telemetry decommutation equipment at command sites		1,494,000	
Data terminal equipment for Bermuda station		2,716,000	
Data and computer terminal equipments for the computer center		1,630,000	
Computer reprograming		1,090,000	
PCM ground station equipment receivers, recorders, discriminators, demodulators			14,379,000
S-band ground-to-capsule data and voice communications systems			5,882,000
Modification of telemetry and acquisition aid systems			5,882,000
Control center equipment			2,615,000
Ranging and positioning equipment for terminal trajectory instrumentation			2,615,000
FM/FM telemetry equipment			1,308,000
Total		19,426,000	35,950,000
Deep space network:			
Maintenance, spares, and replacement	1,179,000	1,945,000	4,095,000
Expansion of network capability:			
Masers			1,396,000
Recording and data processing instrumentation			785,000
Modifications to DSIF antenna			3,050,000
Multichannel receivers and automatic detection and frequency acquisition			2,789,000
Automatic checkout and calibration equipment			3,316,000
Precision ranging			1,569,000
Total	1,179,000	1,945,000	17,000,000
Ground communications network	226,000	546,000	1,465,000
Total, equipment and components	8,751,000	26,417,000	74,645,000

TOTAL NUMBER OF TRACKING STATIONS

Mr. THOMAS. How many stations do you have now? You want to build some 210 feet tall. How many stations do you have now?

Mr. BUCKLEY. Forty-five. Of these, we obtained 12 optical stations, included in the figure, from the IGY days, as well as 12 electronic stations.

Mr. THOMAS. You have built at least 20?

Mr. BUCKLEY. Yes, sir. We have built 22 stations including 16 for the MERCURY net, and decommissioned 1 satellite station.

Mr. THOMAS. What are you going to do with this $158 million? You have systems development, $15.9 million; network operations, $67.8 million; equipment and components, $74.6 million; for a grand total of $158.4 million.

TRACKING SYSTEMS DEVELOPMENT

Tell us about the systems development program of $15.9 million.

Mr. BUCKLEY. This is a support function that is required by the change in the things you must do to keep up with the programs that you heard Dr. Newell and Mr. Holmes talk about. There are some major changes in the things they will have to do, and the ground stations will have to keep up with them, or else the missions are not worth their launching.

Mr. THOMAS. Is this repair, alteration, and improvement of your existing stations?

Mr. BUCKLEY. The entire program breaks down into three parts. We have to operate the stations, $67 million. We have to upgrade our networks to meet the growing and complex needs of these other programs, and we have to put enough effort into development.

Mr. THOMAS. Let's stay with your $15.9 million. What will you do with that?

Mr. BUCKLEY. This is the effort we are going to put in development to prevent obsolescence in the future.

Mr. THOMAS. Explain it so we laymen can understand it. You have data acquisition and electronic tracking and spacecraft command. What does all this mean?

Mr. BUCKLEY. The tracking and data systems that have been in use so far are not accurate enough for the sort of jobs that will have to be done.

Mr. THOMAS. Not strong enough?

Mr. BUCKLEY. Not precise enough. They do not give a high enough quality of data for certain functions such as putting a vehicle into orbit.

Mr. WEBB. I would like to say this basic structure was started in the early days of NASA. We are moving to the time when we do not have only one or two experiments on a given satellite. We will go up to 22 experiments on one satellite.

This means all we have learned in the operation of our worldwide network, and the adjustment, not only to improving it from the state of the art on the ground, but the requirements of these new satellites with many experiments on them, and on the large vehicles like SATURN, we have to modernize the tracking and data network.

Mr. THOMAS. That is your $16 million item?

Mr. WEBB. Yes.

EQUIPMENT AND COMPONENTS

Mr. THOMAS. Let's go to page 23–12. Tell us about this equipment and components. This is about $75 million.

Mr. BUCKLEY. To keep up with these larger satellites, we have to improve the range and sensitivity, for example, by the use of parametric amplifiers. Other changes are needed at the stations to handle more data than they did 2 years ago.

Mr. THOMAS. How many new stations are you going to build?

Mr. BUCKLEY. One new station, but we are expanding the capabilities of some of the others.

Mr. THOMAS. How high and what strength?

Mr. BUCKLEY. The antenna of the new site will have a diameter of 85 feet, sir.

To keep up with the requirements for the vehicles that go far out into space, and to be able to bring back television from them, we are proposing a 210-foot dish to be put at Goldstone.

Mr. THOMAS. Why there?

Mr. BUCKLEY. This is the R. & D. site for the Jet Propulsion Laboratory. It is where the other operational antennas already exist. It is one of our main stations operated under contract by JPL.

NETWORK OPERATIONS

If I may go to the manned spaceflight network, where we have a very successful network. We do not propose to make major changes in this as yet until we have Mr. Holmes' requirements. We know we can go quite a way through the 1-day mission, the GEMINI, and the earth-orbital APOLLO missions by augmenting the equipment already at the MERCURY stations.

Mr. THOMAS. Will this be more of the same, or stronger equipment and more?

Mr. BUCKLEY. It will be far more telemetering equipment because the vehicles that Mr. Holmes will be launching will require a great deal more information brought down from them, especially in the case of the GEMINI program where there will be two men. This will also require better commands sent up to them. We are hoping we can extend our ability to keep up with the manned spaceflight program by using the existing network and only making changes.

Mr. THOMAS. Are you going to build new stations, or use the same locations?

Mr. BUCKLEY. Use the same location and add equipment. We may, however, need some ships. We are studying how many additional ships we will need.

Mr. THOMAS. This $36 million is going to wrap you up for Mr. Holmes' program. Will you be in here next year?

Mr. BUCKLEY. We will be in next year.

Mr. THOMAS. For how much?

Mr. BUCKLEY. We do not know. We will have to wait on Mr. Holmes' study to find out what he needs.

Mr. WEBB. When you have, let us say, a larger engine launched by the SATURN, you have to maneuver the engine. You have to maneuver a spacecraft with two or three men in it. You have an entirely different problem where you are following one spacecraft in orbit that does not have the capacity to maneuver.

Mr. THOMAS. How far will this system reach?

Mr. BUCKLEY. We have measured out to 25 million miles, using an 85-foot dish. We can get out that far or farther. We actually tracked Venus in April and May continuously for 2½ months, using the 85-foot dish, at a distance of about 25 million miles.

Mr. THOMAS. Is this electronic?

Mr. BUCKLEY. This is electronic.

Mr. THOMAS. How far out will it go?

Mr. BUCKLEY. Out to Venus, 25 million miles away, and we can use it far beyond that.

Mr. THOMAS. How do you get new power in some of these out-of-the way places?

Mr. BUCKLEY. Diesel generators, a bank of diesel generators. We have tried to bring firm commercial power in to Goldstone, and we are now about to achieve this in conjunction with service to the local Army post there. In Zanzibar, for example, we have generators.

Mr. THOMAS. What is the nature of this equipment? Is it all electronic?

Mr. BUCKLEY. Yes, all electronic.

Mr. RHODES. What do you use for fuel at Zanzibar, oil?

Mr. BUCKLEY. Yes.

FUTURE TRACKING REQUIREMENTS

Mr. THOMAS. How much more will you be looking for next year?

Dr. SEAMANS. It is awfully hard to say at this time.

One of the areas of investigation right now is the matter of landing the APOLLO. We want to get over into a land recovery as opposed to water recovery. This means more accuracy required for the ground equipment. At this time we really do not know.

NUMBER OF TRACKING STATIONS

Mr. THOMAS. How many of these big stations do you have?

Mr. BUCKLEY. For deep space tracking and data acquisition, three such stations.

Mr. THOMAS. Located where?

Mr. BUCKLEY. South Africa, Australia, and Goldstone, Calif.

Mr. THOMAS. How many tracking stations do you have altogether in the United States? One of your big ones is in England?

Mr. BUCKLEY. There are 16 stations in the United States. The 250-foot antenna in England belongs to the University of Manchester. We have a contract with them for operations on a per-hour basis of about $140 per hour.

Mr. THOMAS. Did you equip it?

Mr. BUCKLEY. We put a small amount of special equipment in there, yes, probably 2 or 3 years ago, and it is still there.

EUROPEAN TRACKING STATIONS

Mr. THOMAS. How many do you have in Europe?

Mr. BUCKLEY. We have a NASA station at Brinkfield; the station at Jodrell Bank belongs to the University of——

Mr. THOMAS. What do they have at Jodrell that we do not have here?

Mr. BUCKLEY. At the moment, we have in this country the ability to do anything that Jodrell can do. We continue to keep Jodrell on our RANGER firings in case there is any mishap and we need its assistance. It is not much of an effort to keep it on. We can do everything it can do.

Mr. THOMAS. How much do we contribute toward maintaining the British station?

Mr. BUCKLEY. The figure for next year is $10,000.

Mr. THOMAS. Do we make a contribution to the British?

Mr. WEBB. $10,000 this next year at Jodrell Bank.

Mr. THOMAS. What are you spending at the University of Manchester station?

Mr. WEBB. That is the same station.

Mr. THOMAS. Only one station?

Mr. WEBB. Yes.

Mr. THOMAS. It will cost us about what?

Mr. BUCKLEY. $10,000 a year. The Brinkfield station is operated at no cost to NASA.

NETWORK OPERATIONS

Mr. THOMAS. Now, break down this $67.8 million for network operations, beginning on page 23–8. How many people are involved in these stations living on the ground?

Mr. BUCKLEY. Between 1,000 and 1,100.

Mr. THOMAS. Does this $67 million cover salaries and expenses?

Mr. BUCKLEY. Most of our operations, of course, are contract operations. For example, in the station in South Africa, we only have one NASA man.

SATELLITE NETWORK

Mr. THOMAS. Take your satellite network. That is $17 million. What does this cover?

Mr. BUCKLEY. It covers among others, a contract with Bendix for $4.9 million; a contract with the Department of Supply in Australia for $725,000; a contract with another agency, CSIR in South Africa, for $410,000; a contract with an institute in Peru for $225,000; the University of Chile, about $500,000; it covers our part of the operation of Fort Churchill to the extent of $1.2 million. The Air Force provides the other half.

Mr. THOMAS. There is no money in here for equipment. Your equipment is covered in your other two paragraphs?

Mr. BUCKLEY. These are purely operational contracts.

Mr. THOMAS. What is the difference between a network satellite and a deep space network? What is your technical difference there? Is it in the size and the power?

Mr. BUCKLEY. The power. The size of the antenna was different a year or two ago, but the larger satellite vehicles now also require 85-foot antenna ground stations.

Mr. THOMAS. How many satellite network stations does this $17.7 million in 1963 cover?

Mr. BUCKLEY. Fifteen electronic and twelve optical.

DEEP SPACE NETWORK

Mr. THOMAS. Your next item in deep space network; $9.2 million. What does this cover?

Mr. BUCKLEY. That covers the three deep space stations.

Mr. THOMAS. Where are they located?

Mr. BUCKLEY. South Africa, Australia, and Goldstone, Calif.

Mr. THOMAS. These are the big ones?

Mr. BUCKLEY. Yes.

Mr. THOMAS. How many of our own people are involved in the operations?

Mr. BUCKLEY. One of ours in Africa, another is in Australia, and I would think probably 50 JPL people at the Goldstone station.

Mr. THOMAS. Is that covered by the Air Force, or do you pick up the check here?

Mr. BUCKLEY. That is our own station, sir. It is associated with the Jet Propulsion Lab.

Mr. THOMAS. What type of people do you have overseas?

Mr. BUCKLEY. Technicians.

Mr. THOMAS. Foreign nationals?

Mr. BUCKLEY. It depends upon the country. In Australia, all the operators are their own nationals. On the other two dishes in this deep space, some of the support personnel are their own nationals, in the two oversea stations.

MANNED SPACE FLIGHT NETWORK

Mr. THOMAS. What about this $24 million for manned space flight network? How many stations does this cover?

Mr. BUCKLEY. Sixteen. The manned space flight network.

Mr. THOMAS. The man is not ready to do business.

Mr. WEBB. This is for all manned space flights.

Mr. THOMAS. How many are involved here?

Mr. BUCKLEY. Sixteen in all. There are the five that Bendix operates at a cost of some $11 million——

Mr. THOMAS. Any new ones in here?

Mr. BUCKLEY. No, sir. There are two in Australia, as you remember. These are the 16 stations that Glenn went over in his trip around the world, and this is a charge for operating them. There are various ways of operating them.

Mr. THOMAS. Mr. Holmes is only going to build one new station; is that right?

Mr. BUCKLEY. We have no new ones in for the MERCURY network at this moment. The one new station that I referred to belongs in the first category there of the satellite network. It is a proposed station in the Far East. The site is yet undetermined.

NETWORK COMMUNICATIONS

Mr. THOMAS. What about your network communications? What does this cover?

Mr. BUCKLEY. We have to tie all these stations together with communications so that they can operate as a coordinated unit. We use leased circuits from various common carriers and no equipment of our own. We use leased circuits from common carriers.

Mr. THOMAS. You have to deal with the countries in which your installation is located and their facilities; is that it?

Mr. BUCKLEY. It is very advisable to use the common carrier that is native to that country. This allows us to get in without having the trouble of legal problems or special licenses.

Mr. THOMAS. Is it a leased lines basis?

Mr. BUCKLEY. Yes, sir. For instance, in Africa, the company that is used to working with all of these countries is British Cables & Wireless.

Mr. THOMAS. What kind of deal do they make with these countries, on an hourly basis, word basis?

Mr. BUCKLEY. For any of our major stations we have leased circuits on a yearly basis.

Mr. THOMAS. Why does this go up about $1 million over last year?

Mr. BUCKLEY. The major new item in there is the need for some additional voice circuits in connection with Project MERCURY.

DATA PROCESSING

The next item is "Data processing." Some of that is a charge for the Smithsonian. The data from the 12 optical stations are processed at the Smithsonian. There is a small item of $150,000 for processing data at New Mexico University and finally $1,138,000 for contracts with such firms as IBM and CEIR locally here, and at JPL, for obtaining data processing services.

Mr. THOMAS. Where are these contracts broken down?

Mr. WEBB. They are not broken down in the justification book.

Mr. THOMAS. What do you do out at Goddard?

Mr. BUCKLEY. In connection with the data processing?

Mr. THOMAS. Yes.

Mr. BUCKLEY. All the satellite tracking data goes into Goddard and all their orbits are computed out there, using a general-purpose setup we have. In addition to that, the Project Mercury operations are tied in with the whole network through Goddard.

Mr. THOMAS. How do these other institutions get in on the picture if you do it all out of Goddard? Do you do it all at Goddard?

Mr. BUCKLEY. No, sir, this is data from the satellite electronic tracking stations at Goddard. The Smithsonian gets the data from their optical stations. On the other hand, there is some computation done specifically for deep space missions at JPL.

USE OF SMITHSONIAN OPTICAL STATIONS

Mr. THOMAS. Is it necessary to have the optical stations as well as your electronic stations? How do they combine?

Mr. BUCKLEY. The optical stations were put together by the Smithsonian. We use data from there to run analyses of the perturbing forces, the forces created——

Mr. THOMAS. Where are their facilities? Do they have one in Chile?

Dr. NEWELL. They have one in White Sands, one in Argentina.

Mr. THOMAS. What about our big one, Mr. Rhodes, in your area?

Mr. RHODES. That is not completed.

Mr. BUCKLEY. The facility at Kitt Peak is the normal astronomical telescope that isn't created to move very fast. It isn't a good thing to track satellites.

Mr. THOMAS. Do you mean you don't have enough axis?

Mr. BUCKLEY. It has the range of movement but it cannot move very fast. They point at a star and move very slowly as the star moves and it is not geared to do this kind of job. You can use a far smaller and far cheaper facility.

Mr. THOMAS. It has the power though?

Mr. BUCKLEY. Yes, sir.

Dr. NEWELL. The normal telescope is designed to track at the rate at which the earth turns, but not at the rate that a satellite goes by.

Mr. WEBB. This worldwide tracking and data acquisition system is one of the continuing assets this Nation has out of the space program.

It is a very important asset. Many of these nations cooperate with us in this program, furnishing their own nationals and in some cases paying the cost of the stations. This is one important element of a civilian program like this because many of the nations are anxious to cooperate in it on the basis it is set up but would be somewhat concerned with a military station in their country.

Now, by operating this and staying in very close touch with all of the units of our governmental structure, we perform a function here that has benefits far beyond our own agency.

SOVIET TRACKING STATIONS

Mr. THOMAS. Mr. Administrator, tell us how many of these tracking stations the Russians are working and where they are located.

Mr. WEBB. They do not have very many. At least around the world. They use quite different techniques than we do and I am certain do not get the same kind of data from satellites. Indeed the kind of satellites they have launched do not require these kind of accurate observations for tracking and so forth.

Mr. THOMAS. Do we have any intelligence that leads us to believe they have any tracking stations outside of their own country?

Mr. WEBB. Well, of course, we all know they have some ships. I think I would rather not answer that question if you don't mind, at least on the record.

Mr. THOMAS. Can they do a better job than we do, Dr. Newell?

Dr. NEWELL. We have observed that the Russians in the past year or more have been attempting to solicit the support of our own tracking stations, and those that other countries have put up for their own units, in their space program which leads us to believe that they feel a shortage. Recently in COSPAR it has been agreed that all countries will list their tracking stations.

Now we are hopeful that Russians will list their electronic tracking stations which they have never done before. If that happens we will have more information.

Mr. WEBB. Let me say one other thing, Mr. Chairman: This is one of the areas where President Kennedy has proposed the possibility of cooperation with the Russians so as to make the networks that we both have of far more value in the total space effort and has made some suggestion which would not, we think, involve basic problems for the Russians that would make them decline the offer of cooperation, if they really seriously mean to cooperate.

NECESSITY FOR MULTISTATION TRACKING NETWORK

Mr. THOMAS. Let me ask this question: Why is it necessary now to have one, say, on the east coast of the United States or the west coast of the United States and then have one in Chile and then have one in England and then have one in Australia? Why is it necessary to have these 40?

Mr. WEBB. Let me make a brief statement and then let the experts answer: First of all, in looking at the problems of continuing space programs serving all the needs of the country, we developed a sort of fence north and south, with stations that could acquire data and follow

vehicles that were flying as they passed over the fence. Then we developed a second worldwide system that could follow the flight of manned spacecraft and in the case of some of the stations could follow other types of satellites such as TIROS weather satellite and so forth. Everyone of these stations has a very real function in connection with the flight program.

Mr. THOMAS. High, low, and very high?

Mr. WEBB. Different geographic orbits.

Mr. THOMAS. And at any particular time are you going to be able to keep up with anything that is in space regardless of its altitude? When you have said that you have just about covered it; haven't you?

Mr. WEBB. Our vehicles.

MILITARY AND NASA TRACKING OPERATIONS

This agency does not attempt to keep up with all things in space. The military do more of that than we do.

Mr. THOMAS. You could if you wanted to?

Mr. WEBB. No, sir; our equipment is not aimed to track silent satellites and other objects. It is designed to work closely with our own vehicles.

Mr. THOMAS. Do you mean your equipment won't pick up a silent one?

Mr. WEBB. If we know where it is, we could pick it up but it takes a great deal of effort to pick up those where the position is not known or the orbit is not known.

Dr. SEAMANS. Our stations are designed to work with the satellites. We have beacons and we relay information back and forth.

Mr. THOMAS. How about the military?

Dr. SEAMANS. They are concerned with early warning, with observation, surveillance of the area to see if any foreign objects or hostile objects are there.

Mr. THOMAS. Could you tie the two together?

Mr. WEBB. We work very closely together.

Mr. HOLMES. The military is primarily for silent satellites.

Mr. THOMAS. Does the military have any on the same compound space network?

Mr. WEBB. We do not wish to discuss the location on the record unless it is important to the committee.

Dr. SEAMANS. It is true Mr. Buckley works closely with the Department of Defense and we use their facilities, and we provide them with information.

Mr. BUCKLEY. This does not refer to the early warning type of stations.

Dr. SEAMANS. I refer to the satellites they have in orbit and so forth.

Mr. THOMAS. Your early warning is an entirely different thing anyway; isn't it?

Mr. WEBB. Yes, sir. Both the military and NASA have certain satellites in orbit and on many occasions when both networks are used by the Nation, we do that work that we need to do with satellites.

Mr. JONAS. Mr. Chairman, I have three general questions.

Mr. THOMAS. If there are any general questions we will go into them fully.

UNIVERSITY PROGRAMS

Mr. JONAS. What is this new program you are beginning with the colleges?

Mr. WEBB. Dr. Newell, I think you might speak to that. This is his program. It is under his direction.

Mr. JONAS. What is that program?

Dr. NEWELL. In the universities, we find perhaps the largest reservoir of basic research talent that we have in the country. This basic research talent has a very special property, it reproduces itself, whereas although the laboratories of the Government, industry, and other institutions also use research talent they do not have the capabilities to reproduce it. We find in our space mission that it pays us to work closely with the universities, both to get basic research done to have them participate in our space program in the applied research and advanced research technology program, and to have them provide research that we and other people need.

Our programs with the universities involve contracts and grants to the universities for support of research that applies to our mission, for the support of the training of people and a general strengthening of the university participation in the program.

RELATION OF NATIONAL SCIENCE FOUNDATION FUNCTIONS TO NASA UNIVERSITY PROGRAM

Mr. JONAS. Isn't that exactly what the National Science Foundation does? Aren't you overlapping with their function?

Dr. NEWELL. We are not overlapping with them because we work very closely with them. In fact we have a monthly meeting with the people of the National Science Foundation who are involved in this problem.

Mr. JONAS. You are not overlapping, you are just doing some of the same kind of work.

Mr. WEBB. That is right, I think, Mr. Jonas.

In these predoctoral training grants we endeavor to cluster some of our ablest young men around some of our ablest space scientists, and you have to support them to enable them to work in this field. Otherwise they go into medicine, chemistry, or some other field.

Mr. JONAS. That is exactly what the National Science Foundation is doing and we started off with that Foundation. That is its primary mission and it is not your primary mission. Why don't you draw on their experience and on their scientific developments?

Mr. WEBB. We do, but the plain fact is their programs are not clustering around Dr. Silver, Dr. Simpson, and Dr. Van Allen and the other scientists in our program, a sufficient number of these very bright, able young research men, and therefore we are trying to add to those.

Mr. JONAS. Yes, but if you go to NSF and tell them, just like any other agency does that is interested in research—in basic research in some particular field—that you have a need for studies in this field, you wouldn't have any difficulty selling them and we could keep our college fellowship program in one agency, then, instead of following the pattern that we have seen develop over the years where every

agency of Government is doing the same thing. Defense is doing it, NASA is doing it, FAA is doing it, and the National Science Foundation was set up and created to do that very thing.

Mr. THOMAS. And Atomic Energy.

Mr. JONAS. Yes, Atomic Energy is doing it.

That is the thing that causes people sitting on this side of the table to wonder why there is not more coordination in these programs and why doesn't each agency stick to his own field and not have so much overlapping?

Mr. WEBB. I have considerable sympathy with your point of view and the problem. On the other hand we are faced with the fact if this project is to go forward in an agency which spends in its own structure only some 8 or 10 percent of the funds for which it is responsible and therefore requires outstanding research to be prepared to direct the work and at the same time develop competence to be sure we get our money's worth out of the large expenditures, we simply don't have enough of these very bright, able, younger men working with our outstanding scientists in space.

Mr. JONAS. How much are you going to spend on this cooperative program?

Mr. WEBB. $2 million in this first year.

Mr. JONAS. You just are beginning it, you are just proposing it, and you haven't started the program yet.

Mr. WEBB. We have announced 10 universities, each with 10 predoctoral trainees.

Mr. THOMAS. If I may interrupt you, you have had this program for 15 years or 18 years. Your predecessor agency had it. You better straighten out the record in that respect.

Mr. EVINS. Supporting a statement of Mr. Jonas regarding the funds of the National Science Foundation, they have ample funds for making grants in various fields, upon application, as you are well aware. I think many of your requests would be much more basic and much more important than perhaps many of the research papers they are making awards for. You are a good salesman, Mr. Webb. Just let them know your needs.

Mr. JONAS. Do you have any information as to what your predecessor agency was doing in this field?

Mr. THOMAS. I have a figure in mind of $500,000, but I am not sure.

Dr. SEAMANS. That is $500,000 to $1 million.

Mr. WYATT. That was for specific items of research, however.

Mr. JONAS. They were not as I recall for postdoctoral study by individuals.

Mr. WEBB. No, sir; they were not.

Mr. JONAS. They were research projects. What you are proposing to do is grant fellowships, or put up the money to pay for further study by various scholars in the fields that you are interested in.

Mr. WEBB. If I could go off the record for just a moment——

Mr. JONAS. It is all right, but I want you to put on the record some reason for this program.

Mr. WEBB. May I go off the record for just a moment?

Mr. JONAS. Yes.

(Discussion off the record.)

Mr. JONAS. I think this should be on the record.
Mr. WEBB. On the record.

NATURE OF NASA UNIVERSITY PROGRAM

Mr. Jonas, the situation as it exists in this country today is that a number of outstanding space scientists in the universities that we have selected such as the University of Chicago are prepared to bring very bright, able candidates for the Ph. D. degree into their laboratories, work with them, use them in their research, and use them in connection with teaching. We have, therefore, instituted a program to combine our research support with the production of more Ph. D's. In a sense, we are placing our research grants in the institutions that do graduate education and training as well as research, thereby increasing the number of scientists capable of working in the very advanced fields of space science.

Mr. JONAS. Who selects the students?
Mr. WEBB. The university. That is a grant to the university.
Mr. JONAS. The blanket grant to the university to train x number of people.
Mr. WEBB. Not a blanket grant. One in which we would work very closely with them and have to agree to the selection, but we place the responsibility on them to make the selection of the student to work with their professors in that laboratory.
Mr. JONAS. Do you have any contract with the students for employment?
Mr. WEBB. The university makes the contract with the student.
Mr. JONAS. How do you know you are going to get the advantage of his ability after he graduates and gets his degree?
Mr. WEBB. The specialized graduate training they receive will equip them to stay in the space fields. We are depending on the universities and have so worked out an arrangement with them to select the people who can and will make the contribution. There is no way to tie these men into a relationship that requires their continued services.
Mr. JONAS. Well, what you are doing is just supplementing what the National Science Foundation is doing and that is broadening the base of our education in science.
Mr. WEBB. This is right, except that our efforts will support a direct, rather than an incidental, buildup of the scarce skills we need for research in space.
Mr. JONAS. Without any hold on the degree holders and without any assurance that you as an agency will ever derive any benefit from their knowledge and training?
Mr. WEBB. We have no legal hold on them but the way the system has worked out we believe we have a better opportunity to have them come into the space field and work actively and continue in it than any other device we have been able to figure out.
Mr. JONAS. If John Smith goes through the University of Chicago and gets a degree on your money and then General Dynamics or Aerojet or General Motors or Pennsylvania Railroad offers him more money than you can offer him, there is no way that you can require him to work for you?

Mr. WEBB. That is right, but we hope that an association with men like Dr. Simpson at Chicago, for example, would mean that a substantial number would stay at the university and teach and continue to do space research in the institute where they work.

Mr. JONAS. That is what worries me. You are not using this program to train people to come into your organization to assist your program. You are embarking on a program of support of scientific education that is exactly what the National Science Foundation was set up to do.

Dr. NEWELL. This is not quite the way it is organized. It is true we don't have a contract with these students. However, the students we are supporting are people who are working with men like Van Allen or John Simpson or John Winkler and in the course of getting their degree they work with other people who are in the NASA space science program. So that instead of for example hiring some disinterested subcontractors, these universities are using people who go into the field. Now we already know that a large part of these people go into the sort of work we want them to go into. For example, Carl McIlwain from the State University of Iowa has gone to the University of California at San Diego where he is continuing the space science work we wanted him to.

Mr. JONAS. You know Dr. Van Allen is up to his ears in the National Science Foundation. He is one of the shining lights in that organization.

Dr. NEWELL. We know that and in our monthly meetings we keep each other informed as to what is going on, so what the National Science Foundation does with Van Allen and what we do with him does not duplicate.

DIFFERENCE BETWEEN NASA AND NSF PROGRAMS

Mr. JONAS. Frankly, Mr. Chairman, I haven't heard anything yet that differentiates this program to any degree whatsoever from NSF's.

Mr. WEBB. It is differentiated because these men by the arrangements we have with the university are selected from those who want to work in the field of space science, go into laboratories with men like Van Allen, Simpson, Silver, and Winkler and where the university and we both believe they are good investments for the space science field.

Mr. JONAS. You are going to have what, 100?

Mr. WEBB. Yes, sir.

Mr. JONAS. One hundred men.

Don't you think if you would pick out 100 with whatever help you need in making the selection you could go to the National Science Foundation with a program proposing a grant to these 100 men to study at certain institutions, that you wouldn't have any difficulty selling them on that program?

Mr. WEBB. There is one difference I believe, Mr. Jonas: The National Science Foundation generally works on a formula by which they have to accept on a kind of a national pattern applications and requests from a broad range of institutions who may meet the criteria or the formula.

In our case we are working selectively with those universities and with those professors and with an understanding that both the university and the professor will bring into the laboratories that are now working in the field the students who have the greatest opportunity. It is a much more rapid way of getting directly to the relationship between the predoctoral student and the space scientist who must do the research to understand the earth-sun relationships and these other areas so important to us.

Mr. JONAS. Are you sure you have authority to do this?

Mr. WEBB. Yes, sir; I feel sure that we do.

Mr. JONAS. Check that.

Mr. WEBB. All right, sir.

Mr. JONAS. I wish you would put in the record when it comes down a citation of the section.

(The information supplied follows:)

We regard sections 203(a)(2), 203(b)(5), and 102(c) of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2473 and 2451) as authority for NASA's predoctoral support program.

CONSULTANT SERVICES ON UNIVERSITY PROGRAM

Mr. JONAS. Why was it necessary to hire so many consultants to help you with this program? With all the highly skilled men you have in the agency, I should think you would be the last agency to need a consultant.

Mr. WEBB. You refer to the university program now?

Mr. JONAS. Yes.

Mr. WEBB. The first thing we want to do is to find out how the universities are prepared to work with us. We called a number of men from the universities all over the country to come in to a 3-day session in which Dr. Newell and I and others in the agency met with them to go over the problem and to prepare a pretty carefully worked out record on how we and the universities could work together in this field. Now this is a relatively new field. We are embarking on the policy of not going to large national institutes for space research on the edge of campuses. Nor are we enlarging the number of universities which carry out a major segment of our development program, such as Cal Tech does with the government-owned facilities of the Jet Propulsion Laboratory. We are establishing our new laboratories under the civil service. We follow the policy of giving research grants in universities for research we need, coupling that with graduate and postgraduate education in those universities. Our purpose is to have the scholar not leave the university for a while to work in an off-campus institute or even to sell part of his time as consultant to an institute. We hope to keep him engaged full time in the university with this cluster of graduate students around him because the need is so great not only for more space research but also for more trained people.

Under those policies we have to find out how we could establish relationships with universities that would fit in with their own ideas of how they will prepare to work with us.

The only way we could get this advice and bring these people together for this meeting was to put them on as consultants and bring them to Washington for 3 days.

CONSULTANT SERVICES ON OPERATION OF SUMMER WORKSHOPS

Mr. JONAS. You had a man for 186 days at $50 a day to help you decide how to run some summer workshops?

Mr. WEBB. What was his name?

Mr. JONAS. His name is Kenneth Hobbs. How do you justify that? Executive secretary of the Ohio Academy of Science. Fifty dollars a day. Number of days worked, 186. To "assist NASA in conducting portions of college and university summer workshops."

Mr. WEBB. I will have to look into that particular case and give you a statement on it.

(The information supplied follows:)

MR. KENNETH B. HOBBS

Mr. Hobbs, executive secretary of the Ohio Academy of Sciences, was employed as a consulant initially to assist in planning and conducting college workshops in space sciences. There were 143 such college workshops. Because of the heavy workload in the educational program organization, Mr. Hobbs' services were continued to assist in the implementation of an educational audiovisual program. Mr. Hobbs provided a variety of professional services especially in the educational TV area and in the development of NASA films. Mr. Hobbs worked out very well and papers have been in process some time to convert him to a permanent civil service employee at approximately the same salary as he receives as a consultant.

CONSULTANTS FOR INFORMATION SERVICES

Mr. JONAS. Then you have a man named Joseph E. Holmes, 123 days at $50 a day preparing material for speeches, articles, and so forth, as required by the Administrator.

Mr. WEBB. This concerns how we can accumulate the kind of information needed to explain the program and this was a means of bringing a man in who would perform that purpose.

Mr. JONAS. Thirty-seven days at $75 a day to consult on matters concerning this agency's relation with national organizations.

Now, what does that mean?

Mr. WEBB. Who is that person?

Mr. JONAS. William J. Key, public relations counsel.

Mr. WEBB. I am not personally familiar with the work Mr. Key has done. We can give you a statement on that.

(The information supplied follows:)

Veterans, civic, industrial, and professional organizations have deluged this agency with requests for speakers, requests for appearances of astronauts, and requests for educational material. Mr. William G. Key, who has many years of experience with national organizations and is familiar with their information requirements, was employed as a consultant to develop plans and proposals designed to meet the information requirements of these organizations on an orderly and systematic basis. This agency is charged by the Congress in the National Aeronautics and Space Act of 1958 to provide for the widest practical and appropriate dissemination of information concerning its activities and the results thereof. Organizations such as those listed above are one of the most effective means for disseminating information and reaching a significant segment of the population.

Mr. JONAS. There are several others in here who apparently are being used to develop a public relations posture which I didn't think NASA needed.

Mr. WEBB. Well, we have a very real problem here in terms of having to report on the activities that we do. We particularly have the problem of how to work with industry for the feedback in the applications area. We are doing considerable work along that line.

Mr. JONAS. You don't have any trouble acquainting the public with what you are doing. You don't have to go out and hire a consultant to develop that information, do you?

Mr. WEBB. Mr. Jonas, at Cape Canaveral during one of these flights we have at times as many as 500 radio, newspaper, and TV men present. We have the most extreme and excruciating problems in how to handle our relations with the press.

OFFICE OF PUBLIC SERVICE AND INFORMATION STAFFING

Mr. JONAS. How many people do you have on board regularly in your Public Information Section?

Mr. WEBB. We have a number.

Mr. JONAS. How many? And how much does that section cost?

Mr. WEBB. One of our greatest problems is the service of the press, radio, and TV.

Mr. JONAS. I thought you had a regular department for that.

Mr. WEBB. Part of this is defensive, Mr. Jonas, and not an aggressively seeking publicity action.

Mr. JONAS. Can you show in the record what your Public Information Section costs and how many people you have in it?

Dr. SEAMANS. There are 29 people proposed for the Public Information Section next year.

Mr. JONAS. How many people are in it now?

Mr. WEBB. We will furnish that.

(The information supplied follows:)

The Office of Public Services and Information is currently staffed with 26 people.

Mr. JONAS. What will that cost?

Mr. WYATT. The salaries will be $260,000.

NATIONAL CONFERENCE ON PEACEFUL USES OF SPACE

Mr. RHODES. Mr. Administrator, your conference in Tulsa wasn't exactly a defensive operation, was it?

Mr. WEBB. No, sir; it was a part of our program of public information.

Mr. RHODES. How much did that cost to take people from NASA out to the symposium in Tulsa and put that whole show on?

Mr. WEBB. I cannot give you that offhand.

Mr. RHODES. I have it in my files somewhere. I think you wrote me a letter about it. Perhaps it would be a good idea to resurrect the figure and put it in at this point if you will.

Mr. WEBB. All right, sir.

(The information supplied follows:)

Forty NASA representatives attended this Conference. Seventeen of these traveled from NASA headquarters, Washington, D.C., and returned to headquarters. Since there were no specific moneys set aside for this Conference the figures are based on our best estimates. The total travel and transportation expenses estimated, including per diem and miscellaneous expenses (such as

taxicab fares) approximate $8,000. Salaries applicable to the Conference participants from NASA on Thursday and Friday are approximately $4,300.

The development and display of exhibits designed to inform the public of representative activities of NASA is a continuing function. No exhibits were developed or prepared specifically for the First National Conference on Peaceful Uses of Space. No reliable means exist for allocating a portion of the costs of these exhibits to the First National Conference on Peaceful Uses of Space.

NASA estimates that the Tulsa Chamber of Commerce assumed support in the amount of $70,000 for the Conference, by far the major cost, and that the entire program, in light of the statutory objective to disseminate information, was well worth the effort.

NEED FOR CONSULTANT SERVICES

Mr. JONAS. How much are you spending this year on consultants?

Mr. WEBB. Again I can't give you the exact figure.

Mr. JONAS. We have asked for it and have the record, but I haven't added it up. I thought perhaps your budget officer would have that information.

Can you put it in the record at this point?

(The information supplied follows:)

Cost of consultants

	Headquarters	Centers	Total
Personnel services:			
1961	$52,833	$35,402	$88,235
1962	175,000	90,000	265,000
1963	300,000	150,000	450,000
Travel:			
1961	3,500	34,985	38,485
1962	8,000	104,000	112,000
1963	12,000	133,000	145,000
Total:			
1961	56,333	70,387	126,720
1962	183,000	194,000	377,000
1963	312,000	283,000	595,000

Mr. WEBB. We are working in a wide variety of fields. For instance, in the question of how to develop better incentive contracts.

Mr. JONAS. Haven't you got enough people out of 21,000 to do that without hiring all these $100-a-day people?

Mr. WEBB. We do not have a man on the staff, and I doubt if there is a man working for the U.S. Government, as highly qualified as Dr. Mervin Kelly, former chairman of the board of the Bell Telephone Laboratories who has given a substantial part of his time as a consultant without charge except for transportation, and we have arranged for Dr. Arthur Raymond, former executive vice president of the Douglas Co. to spend up to half his time in helping us develop the kind of research tools we may need to make this Nation preeminent over the next 10 to 25 years. And a good deal of what we recommend to you in our future years will be based on the judgment of men like that. And we do need those men very badly.

Mr. JONAS. I can see how you would need some consultants in technical fields, but I do not see, considering your experience, why you need a consultant to help you with management problems in your office. I think you know more about how to manage this organization than any consultant you could hire. Yet you have three or four consultants hired at $100 a day.

Mr. WEBB. But this is a tremendously big organization and when I leave my office between 8 and 9 o'clock at night there are still a lot of things I leave undone. If I can't use some very able men of this kind to organize an effort that is headed toward $5 billion a year, the Government isn't going to get its full money's value out of it.

Mr. JONAS. How many people do you have in your office regularly, in your headquarters organization?

Mr. WEBB. Well, the headquarters organization is about 1,100 or 1,200 if I recall correctly, and we are estimating under this budget going up to 1,900.

Mr. JONAS. I certainly don't expect you to handle all of the problems individually, but you have some people hired here as consultants at a hundred dollars a day who don't know as much about management problems as you know.

Mr. WEBB. I think that is undoubtedly so. But I think also they are doing work that I simply don't have the time to do if I am going to do a total job.

Mr. JONAS. Neither you nor the other 1,100 in the office?

Mr. WEBB. That is right. These 1,100 are busy and overworked right now. And if you go by our building at 7 or 8 o'clock at night you will find more people working there than you will in any other place in this city that I know of.

To put a thing like this together and double it every year is one of the biggest undertakings the human race has ever undertaken. You can look at Alexander, or Hannibal, or the building of the Chinese wall. This is a tremendous undertaking, and it takes specialized brainpower to put it together and form a team out of it and make it go. I think we have done a good job in that regard, Mr. Jonas.

Mr. JONAS. I am not questioning how good a job you did. I am inquiring as to whether you need to spend all of this money to hire these $100-a-day consultants when I think you have people in your own organization on the regular payroll who are able to do that work that the consultants have been doing.

Mr. WEBB. I thank you for that suggestion and certainly I don't want to spend a cent that would not contribute to the effort. I think when you are pushing forward with a big effort like this you have got to push in several different directions and you have got to use the best brains that you can, and this is what we have been trying to do.

We would not defend every action we have taken. We have made our part of the mistakes. And I am sorry for them, but I think if you add it all up you will find that including that $100 a day, there has been a real job done here in a way that provides value for this money.

Mr. JONAS. How much money are you asking for next year for consultants?

Mr. WEBB. I don't know if that is accumulated.

Dr. SEAMANS. It does not show the line item. The travel for the consultant does show. Travel of consultants and lecturers, $145,000.

TRAVEL REQUIREMENTS

Mr. JONAS. Now, that leads me to ask if you have a breakout—can you tell us what the total bill is for travel?

Dr. SEAMANS. Yes, we certainly can. This year it is $9,171,000 plus local transportation and toll charges and rentals of passenger motor vehicles bringing it to $9,441,000. Next year it is projected at $16,024,000. Including those last two items it comes to $16,505,000.

Mr. EVINS. Travel is one of the very essential things when launchings are delayed for a matter of days and weeks.

Mr. WEBB. It is one of the toughest problems right now. With the holds on the Glenn flight and the necessity of traveling back and forth caused by those holds, we are in really serious trouble with respect to travel right now.

SUMMARY OF R.D. & O. OTHER OBJECTS OF EXPENSE

Mr. EVINS. Mr. Chairman, did you put page A5–1 in the record?

Mr. THOMAS. No, sir. It should be in at this point.

(The page referred to follows:)

RESEARCH, DEVELOPMENT, AND OPERATION

Summary by object classification of personnel services and institutional support

	1961	1962	1963
End of year employment	17,077	21,880	26,273
11 Personnel compensation	$134,277,705	$166,713,000	$220,311,000
12 Personnel benefits	9,275,518	11,591,000	15,322,000
21 Travel and transportation of persons	5,450,394	9,441,000	16,505,000
Regular travel	(5,260,051)	(9,171,000)	(16,024,000)
Local transportation	(38,245)	(78,000)	(111,000)
Rental of passenger motor vehicles	(152,098)	(192,000)	(370,000)
22 Transportation of things	2,100,461	4,786,000	6,070,000
23 Rent, communications, and utilities	22,378,074	30,921,000	46,433,000
Rent	(12,380,413)	(18,963,000)	(32,101,000)
Communications	(2,359,667)	(4,004,000)	(5,080,000)
Utilities	(7,637,994)	(7,954,000)	(9,252,000)
24 Printing and reproduction	779,691	2,077,000	3,321,000
25 Other services	21,158,402	45,773,500	67,693,000
26 Supplies and materials	15,816,000	22,004,000	27,648,000
31 Equipment	13,052,000	24,406,000	27,486,000
42 Insurance claims and indemnities	8,753	110,000	116,000
Unvouchered	10,000	17,500	35,000
Total obligation	224,306,998	317,840,000	430,940,000
Unobligated balance lapsing	847,628		
Anticipated reimbursements	−6,227,626	−5,641,000	−2,957,000
Total	218,927,000	312,199,000	427,983,000

OPERATION OF GRANT PROGRAM

Mr. THOMAS. I think your educational program is far better than the one your predecessor agency had. You are going out to Dr. Van Allen and these masters and telling them to get 8 or 10 students to train in your line of work. What are you spending on it?

Mr. WEBB. $2,400 to the student and $1,000 of cost to him.

Mr. THOMAS. How much goes to the university?

Dr. NEWELL. This is negotiated, Mr. Chairman.

Mr. THOMAS. What is your total grant to the predoctoral?

Dr. NEWELL. It averages out to be the same as the stipend to the student. But some universities are much cheaper than others.

Mr. THOMAS. Do you allow a certain amount for his wife and children and dependents like we do in the National Science Foundation?

Dr. NEWELL. Yes, sir.

Mr. THOMAS. How does it average out?

Dr. NEWELL. It averages out $3,400.

Mr. THOMAS. How much money do you have in this budget for that? How many students are you going to have?

Dr. NEWELL. In this budget we have $10 million total.

Mr. THOMAS. How many students will that take care of?

Dr. NEWELL. Essentially, we think we ought to work up to where we are helping turn out 1,000 Ph. D.'s a year.

Mr. THOMAS. What is your overhead that you allow the various institutions? Is that on a contract basis?

Dr. NEWELL. No, this is a grant basis.

Mr. THOMAS. How much do you grant them? How much do you allow the institution for overhead expenses? Now, this is a little sensitive area that we are going to throw in here now.

Mr. WEBB. Is this on research or grants or is this on the training program?

Mr. THOMAS. Either one. It doesn't make any difference.

Dr. NEWELL. On the training program this is negotiated with the university and we have found that it varies. Some of the universities are as low as $400 per year per student. Others go up to as much as $3,000 per year per student.

Mr. THOMAS. How much do you have in here for grants to the universities?

Dr. NEWELL. That is the $10 million figure I mentioned.

Mr. THOMAS. That comes to the total, that covers the students and everything?

Dr. SEAMANS. Yes, sir, the training and grants.

Dr. NEWELL. Training and grants.

Mr. THOMAS. Can you break it down? What part goes into training and what part into grants?

Dr. NEWELL. Roughly a third would go into training and the other two-thirds into grants.

ADMINISTRATIVE COSTS OF UNIVERSITIES UNDER GRANT PROGRAM

Mr. THOMAS. Under grants do you put a limitation as to the administrating cost to the university?

Dr. NEWELL. In the case of the grants, the administrative costs and the overhead costs are determined on the basis of past experience.

Mr. THOMAS. Suppose a limitation is put on that money, 15 percent for administrative by the university.

Dr. NEWELL. Then I would find it extremely difficult to develop the university support that I need for my program. I would find that I would be in a position of trying to start a new program on campuses in which other agencies have already established activities.

Mr. THOMAS. If 15 percent is not satisfactory, what are you allowing now?

Dr. NEWELL. It varies. We find many are in the 20- and 25-percent range. Some are up in the 50-percent range. The average would be the 35- to 40-percent range.

Mr. THOMAS. We are trying to arrive at a figure for NASA, the military, the National Science Foundation, the atomic energy people, HEW, and so forth, of 15 percent.

Mr. EVINS. You want to go beyond HEW and Defense.

Dr. SEAMANS. The MIT figure is always very carefully audited by the Navy and it comes out at around 33 percent.

OPERATION OF PROGRAM UNDER 15-PERCENT LIMITATION

Mr. THOMAS. Dr. Newell, could you operate your program on a 15-percent limitation?

Dr. NEWELL. I am afraid I would find I could not develop the program that I want to. I would be competing with other agencies who have already established their relationships.

Mr. THOMAS. Suppose they are all fed out of the same spoon and that 15-percent limitation applies to everybody? What would it do to your entire program of cooperating with the universities?

Dr. NEWELL. I would predict that the universities would have to shore up their present relationships with whatever funds they could devote. They would have to pull back on some things. They would find it extremely difficult to establish new relationships to cover the problems with which we are faced.

Mr. THOMAS. Your money buys equipment and pays salaries. What is wrong with 15 percent now? You buy the equipment. How much money do you have in here for the universities this year for equipment, classroom space, and what have you, other than what we call absolutely administrative expense, the topside people?

Dr. NEWELL. That has to be covered by the figure we put down here.

Mr. THOMAS. Yes, but you are a university man and you know the answers. Now what is wrong with 15 percent particularly in view of the fact—you say we are giving this university here $500,000. You want to go out and buy some type of equipment you think you ought to buy and you say, "Here is $500,000 to buy it with." Since we are buying that equipment why can't they operate with the overhead on 15 percent?

Dr. NEWELL. That isn't the problem they are facing when they work with us.

Mr. THOMAS. Then give us the problem.

Dr. NEWELL. The impact of our program on the universities is different from the impacted programs such as those of the National Science Foundation. When we draw a man into the program to prepare experiments for space flight and so forth he has an engineering and hardware job to do and that engineering and hardware job is the sort of thing covered in his overhead.

Mr. THOMAS. Why couldn't you reverse it around and say if you give him $500,000 he can buy the equipment needed for the construction? Isn't that what they do?

Dr. NEWELL. That is perhaps a way out. You will have to assign to direct charges things that otherwise could have been covered under overhead.

Mr. THOMAS. What you are saying, then, in the long run is that you don't accomplish anything by the limitation; is that right?

Dr. NEWELL. Yes.

Mr. WEBB. You might make it very difficult to carry this program forward.

Mr. BOLAND. I think very few colleges would pick it up. Harvard is 28.2 percent. I really don't think you can say it ought to be 15 percent for every college and university participating in these programs because the costs at some of these institutions are higher in some areas than in others.

I think probably what they did in the Department of Defense bill was not for a comparable program.

Mr. EVINS. The Department of Health, Education, and Welfare has about the most liberal bill of any for scientific research and education.

Mr. WEBB. Our purpose is to pay the actual cost of the overhead in our contracts as audited and determined under the procedures set up in the contract and under the procurement regulations of the Government.

Mr. THOMAS. Of course, every agency in Government—you know they are, they have already been detailed—are making the grants for various subjects and when you get through the Federal Government is right in up to its elbows in the universities.

Some of the topflight people in the field say the universities have to have this money and it is a rather difficult proposition.

Mr. WEBB. From the standpoint of the country and the space program, the really outstanding men like Van Allen and these others we have mentioned, they are great assets that the country has and I would like to see those men come and work for the Government. I think we ought to support them in the university where they reproduce themselves and train graduate students since the strength of the country in this program is there.

Mr. THOMAS. They are geniuses, there is no question about it, and their value is a national asset. They are a national asset.

EXPENSES FOR OPERATION OF JET PROPULSION LABORATORY

I have one other question: What is your overhead at JPL? Now it is in the record here in your very fine tables and I don't want to keep harping on this but we are going to have to go into it. How much do you have in JPL? Did you increase it to $2,300?

Dr. SEAMANS. $3,200, I think.

Mr. THOMAS. Have you green sheets on it?

Mr. WYATT. We have no green sheets.

Mr. THOMAS. Tell us what is in the contract. What salaries do you pay out there? You have some topflight talent out there. What do you pay them?

Mr. WEBB. Cal Tech pays the Director $$30,000 a year. We furnish the money to the California Institute of Technology and they pay it.

Mr. THOMAS. You are 100 percent correct.

Mr. WYATT. Generally the salary available is——

Mr. THOMAS. That is a contract organization out there and can pay higher salaries than the law permits the payment of anybody in this room. Who is your overall contractor out there now?

Mr. WEBB. The California Institute of Technology.

Mr. THOMAS. Do you pay salaries?

Mr. WEBB. We pay certain items of overhead and a fee.

Mr. THOMAS. What is the fee paid?

Mr. WEBB. The fee is less than 1 percent of the volume.

Mr. THOMAS. What does that amount to? One percent of the volume of what, salaries and expenses and other objects, or what?

Mr. SIEPERT. We negotiated those figures just last week for the fiscal year 1963.

Mr. THOMAS. You had that contract several years ago.

Mr. WEBB. These items on a flat-amount basis are determined every year.

Mr. THOMAS. What is your fee?

Mr. SIEPERT. For Cal Tech under the fiscal year beginning July 1, 1962, an overhead allowance, of $950,000. We are paying them a management fee, which is separately negotiated, at $1,250,000. The basis for the management fee of $1,250,000 is determined in this fashion: It was justified in their proposal based upon 2 percent of the direct personnel costs, four-tenths of 1 percent of the first $100 million in other expenditures; and a decreasing percentage of fee for additional volumes of work performed for NASA.

Mr. THOMAS. What are you paying the university? A management fee of $1.25 million and an overhead of another $1 million?

Mr. SIEPERT. $950,000.

Mr. THOMAS. And on top of that every item of expense of the Laboratory?

Mr. SIEPERT. We are paying every item of direct expense of operating the Laboratory itself; that is correct.

Mr. THOMAS. Three layers on one and you are paying salaries in the Laboratory beyond anything under the law you can pay your own people.

Mr. WEBB. Let me say the university itself feels that these fees are on the low side. I have had personal talks with Dr. Pickering within the last 2 weeks about it. This is a contract we took over from the Army. Let me say that in establishing all of our new agencies we have not gone to this——

Mr. THOMAS. Dr. Pickering runs the Laboratory and he is just as smart as they come and just as fine as they come. I am in no position to judge such talent, but you have other laboratories with large personnel with the same responsibilities where we pay a whole lot less. I imagine Dr. Pickering is capable of running that Laboratory without paying the university $2.25 million.

Dr. SEAMANS. I would just like to say I consider that Laboratory a national asset and an asset to the space program. They are handling a large part of our lunar and planetary program, the RANGER, the SURVEYOR, the MARINER.

Mr. THOMAS. Suppose you are right. We are not arguing about it.

SERVICES RECEIVED FROM CAL TECH

What are we getting for that $2.25 million that you couldn't get without paying it?

Dr. SEAMANS. I think we would be very hard pressed to get that without utilizing that Laboratory.

Mr. THOMAS. You own all the equipment. You bought the land. You pay for all the buildings. You pay for every nickel of cost of

operation. Dr. Pickering is an outstanding man. He runs the Laboratory. You don't think he runs over to the university and asks them how to run that Laboratory every morning before he goes to work, do you?

Dr. SEAMANS. No, sir. We do get service from Cal Tech. They participate in the running of the Laboratory. Mr. Green and other key people at Cal Tech assist in the operations.

Mr. WEBB. There is a serious question as to whether the personnel in that Laboratory would leave the California Institute of Technology. A great many are its graduates, a great many have served on the faculty and the fact this is a California Institute of Technology installation certainly has a large amount to do with the fact that they stay there and work there in these areas.

Mr. THOMAS. The California Institution doesn't pay them any salary. The salary is paid by the Space Agency.

Mr. BOLAND. This is a great asset to the university too, of course. They would be doing this kind of work in research anyhow and this is a tremendous thing for them. It is a magnificent advantage for them I would say.

Mr. WEBB. We pointed this out and I would like to add one other thing. I personally went out to the university and talked with Dr. DuBridge and his associates and Dr. Pickering and asked if they wouldn't call a conference of all the universities in California and on the west coast and create a situation in which this Laboratory was working with the space scientists in all of the universities. They have done that and this is opening up a wide area of usefulness for us with the various laboratories out there. With people such as Dr. Silver up at Berkeley and others in a radius of this Laboratory where the engineering and technological side of these space vehicles is made more easily available to them and where some of their own problems, and designing their own particular experiments——

Mr. THOMAS. How did we get in the position in this administration of paying $30,000 and $35,000 salaries when our own people by law are limited to $18,500 up to $21,000?

Mr. WEBB. This was established under the Army before NASA was organized. It was taken over and it has been maintained by us as the best means of getting this work done.

Mr. THOMAS. It was the old Air Force policy; wasn't it?

NEGOTIATION OF NEW CONTRACT

Mr. JONAS. Mr. Siepert, you are just now negotiating a new contract, ready to be signed?

Mr. SIEPERT. No, sir. We have a contract in force for a 3-year period of time. A provision in that contract states that by April 1 of each year there will be an advance determination of the overhead allowance and the management fee to be negotiated each year based upon estimates of how big the program is likely to be.

Mr. JONAS. In this new negotiation are you increasing the fee?

Mr. SIEPERT. The fee is being increased over that paid in 1961 because the program has more than doubled.

Mr. JONAS. Increased by how much?

Mr. SIEPERT. Last year it was—it is a $350,000 increase, so it would be $900,000 last year.

Mr. WEBB. From $900,000 to $1,250,000.

Mr. JONAS. Is the other element being increased, too?

Mr. SIEPERT. Yes, by $100,000, from $850,000 to $950,000.

Mr. JONAS. I think you ought to let the record show here how much you are increasing both these fees.

(The following information was subsequently submitted by the Agency:)

The overhead allowance and increase from $850,000 in fiscal year 1962 to $950,000 in fiscal year 1963. The fee will increase from $950,000 to $1,250,000 for the corresponding period. As you know, the total program at JPL will increase from an estimated $145 million to an estimated $213 million.

Mr. SIEPERT. Now the method for determining the management fee, which is worked out this year and which we believe to be a reasonable one is as follows: that the principal element of management risk that the institution assumes here is in its handling of its inhouse personnel. That is the 3,200 people that were mentioned here. Their management fee is determined on 2 percent of the gross personal services that are paid by the Jet Propulsion Laboratory and then we are paying them a four-tenths of 1 percent fee on the dollars which are expended by them in performing systems work for us. That is for the first $100 million worth of program for which they are responsible. The second $100 million would only be at three-tenths of 1 percent, and so on using a decreasing rate base for any larger program.

Mr. THOMAS. Thank you, gentlemen.

We humbly apologize to you for not being able to finish this hearing. If you will bear with us we will get in touch with you in a week or 10 days and we will schedule another meeting. We will give you 3 or 4 days' notice and try to wind this up with one more session. We hope you will forgive us. It has been a pleasure being with you and we want to thank you. You have a distinguished group here, Mr. Administrator, and we are proud of you and all of your staff.

Mr. WEBB. We appreciate the consideration of the committee, Mr. Chairman.

MONDAY, APRIL 30, 1962.

Mr. THOMAS. The committee will please come to order.

We have the privilege and pleasure of having with us today three distinguished gentlemen who have not been with us heretofore: Mr. Rodolfo A. Diaz, Assistant Director of Facilities; Dr. Albert J. Kelley, Director of Electronics and Control; and Dr. Hermann H. Kurzweg, Director of Research.

Mr. Diaz, you were not with us the other day, were you?

Mr. DIAZ. No, sir. This is my first time.

Mr. THOMAS. Welcome aboard. Do not let it be your last.

Dr. Kelley, we are delighted and honored to have you.

Dr. Kurzweg, I had the pleasure of meeting a while ago. Doctor, we are delighted to have you. Come to see us more often.

Construction of Facilities

Object classification

[In thousands of dollars]

	1961 actual	1962 estimate	1963 estimate
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION			
Direct obligations:			
31 Equipment	41,413	86,627	252,679
32 Lands and structures	56,424	178,020	576,000
Total direct obligations	97,837	274,647	828,679
Reimbursable obligations:			
31 Equipment		6,770	
32 Lands and structures		4,370	
Total, reimbursable obligations		11,140	
Total, National Aeronautics and Space Administration	97,837	285,787	828,679
ALLOCATION ACCOUNTS			
25 Other services	8	4	
32 Lands and structures	349	17	
Total, allocation accounts	357	21	
Total obligations	98,194	285,808	828,679
Obligations are distributed as follows:			
National Aeronautics and Space Administration	97,837	285,787	828,679
Atomic Energy Commission	4		
Department of Commerce	4	12	
Air Force	349	9	

Program and financing

[In thousands of dollars]

	Budget plan (amounts for construction of facilities actions programed)			Obligations		
	1961 actual	1962 estimate	1963 estimate	1961 actual	1962 estimate	1963 estimate
Program by activities:						
Direct:						
1. Manned space flight	53,392	179,883	635,048	21,267	150,680	675,682
2. Space applications	4,037	3,702	3,175	2,560	6,720	3,175
3. Unmanned investigations in space	8,904	27,796	12,200	13,679	33,187	12,200
4. Space technology	25,704	28,724	112,070	17,753	49,787	85,371
5. Aircraft and missile technology	2,611		1,807	11,292	5,771	2,128
6. Supporting operations	31,649	27,761	54,698	31,643	28,523	50,123
Total direct	126,297	267,866	818,998	98,194	274,668	828,679
Reimbursable:						
2. Space applications		11,140			11,140	
Total	126,297	279,006	818,998	98,194	285,808	828,679
Financing:						
Unobligated balance brought forward for completion of prior year budget plans				−49,369	−77,472	−70,670
Unobligated balance transferred from "Military construction," Advanced Research Projects Agency, Department of Defense (42 U.S.C. 2453)	−1,070			−1,070		
Unobligated balance transferred to "Research and development" (74 Stat. 436)		1,490			1,490	
Advances and reimbursements from other accounts		−11,140			−11,140	
Unobligated balance carried forward for completion of prior year budget plans				77,472	70,670	60,989
New obligational authority	125,227	269,356	818,998	125,227	269,356	818,998
New obligational authority:						
Appropriation	122,787	245,000	818,998	122,787	245,000	818,998
Transferred from—						
"Salaries and expenses" (74 Stat. 436)	590			590		
"Research and development" (74 Stat. 436 and 75 Stat. 355)	1,850	24,356		1,850	24,356	
Appropriation (adjusted)	125,227	269,356	818,998	125,227	269,356	818,998

NOTE.—Reconciliation of budget plan to obligations:

	1961 actual	1962 estimate	1963 estimate
Total budget plan	126,297	279,006	818,998
Deduct portion of budget plan to be obligated in subsequent years	61,023	69,725	53,624
Add obligations of prior year budget plans	32,920	76,527	63,305
Obligations	98,194	285,808	828,679

GENERAL STATEMENT

Mr. THOMAS. Dr. Dryden, do you or any of your colleagues want to talk to us generally about construction of facilities? Then we shall go into specific detail. We would be delighted to hear you.

Dr. DRYDEN. I have no prepared statement, Mr. Chairman.

Mr. THOMAS. You never did need one.

Dr. DRYDEN. I will leave the detailed presentations to Dr. Seamans and the others present. I might say in the major undertakings which have been assigned to NASA, the job of developing the technology of putting man on the moon, the part of the job which takes the longest time is the facilities—the launch stands, the statics test stands, the special laboratory equipment that is necessary, such things as the preparation of the Michoud plant for manufacture of the large boosters. So, in a certain sense the time when this job is accomplished is determined very largely by the speed with which we get the major facilities started.

You will find, I think, in the course of our discussion that the largest proportion of the facilities money is connected with manned space flight. The presentation before you is in two volumes arranged alphabetically by location.

Mr. THOMAS. The information is technical, but the job is well done, far better than the research and development end.

Dr. DRYDEN. I would think the only remaining part of the general statement would be that we have made estimates according to the experience of our own people and drawing on the experience of the military services who have built large test facilities and launch stands. As has been the case in past years, we have not designed in detail every one of these facilities, so the cost is not based on competitive bids, but is based on analyses of the jobs according to the best information we have.

I think with that, Mr. Chairman, we might proceed as you wish down the list.

Mr. THOMAS. Dr. Seamans, have you anything you wish to add?

Dr. SEAMANS. I might just state briefly, Mr. Chairman, that the construction of facilities requests are contained in two volumes according to location. However, we have a list, which I believe has been transmitted to your committee, which indicates the justification for these facilities in terms of particular program areas.

MANNED SPACE FLIGHT

As Dr. Dryden indicated, the largest amount is in support of manned space flight, particularly for the manned lunar landing and return, which amounts to $635 million.

ADVANCED RESEARCH AND TECHNOLOGY

The next largest amount is in support of our advanced research and technology program in the amount of $113 million. There are two large items in this amount. One is for the facility at the Lewis Center in Cleveland, which Dr. Silverstein discused with your committee, and the other is for the nuclear rocket development station.

TRACKING AND DATA ACQUISITION

Then we have $54 million in support of our tracking and data acquisition. As is well recognized, to place these large payloads into orbit and to keep track of them in orbital flight or as the spacecraft proceeds to the Moon, you must have a series of stations in various locations around the world. In addition to the tracking functions

these stations are needed to obtain the necessary scientific information from the spacecraft. We are proceeding with additional equipment at our stations, and we are also proceeding with larger antennas which will permit not only lunar exploration but also exploration of the planets.

SUPPORT OF SPACE SCIENCE

Finally, there is $12 million in support of the space science program, and $3 million in support of the application program.

It appears to me that discussion of the individual items can best be presented by our program directors and, subject to the wishes of the chairman, the program directors might proceed with the justification as contained in the budget books.

Mr. BOLAND. I think we had a good rundown on the Marshall Space Flight Center when Dr. von Braun was here; did we not? We discussed some of the facilities there.

Dr. SEAMANS. We discussed particularly the facilities for static testing, the relationship between the static test stands at Huntsville and the facilities we are requesting for Mississippi, and the fact that the research and advanced type work will be done at Huntsville and the operational type testing in Mississippi.

ATLANTIC MISSILE RANGE

Mr. BOLAND. I note the two big items in this justification center around the Atlantic Missile Range and the various locations. Are the tracking stations you were talking about included in the various locations?

Dr. SEAMANS. Yes; that would be contained there.

Mr. BUCKLEY. It is contained in that; yes, sir.

Mr. BOLAND. What is most of the $360 million which you plan to spend on the Atlantic Missile Range? That is an increase of close to $300 million over fiscal year 1962. What is that for?

Dr. SEAMANS. This, of course, relates to the launch facilities required for the advanced SATURN and for the NOVA. If you would like, Mr. Holmes can discuss that now.

Mr. BOLAND. We will wait for that until Mr. Thomas returns.

Dr. SEAMANS. I might expand on that. We have considered various methods for a launch complex to see whether we can cut down the time on each pad and consequently get more use out of our facilities. We are planning to use the so-called integrated transfer complex for SATURN, wherein the vehicle will be completely assembled inside of a roofed-over building and checked out away from the elements. Following this, it would be moved by barge in a vertical position out to the launch pad for fueling and launch within approximately a 2-day period. This will cut down the requirement for pads and, consequently, cut down costs and also improve the utilization of land at Cape Canaveral.

PACIFIC MISSILE RANGE

Mr. BOLAND. You do not have any money in the budget in fiscal year 1963 for construction at the Pacific Missile Range, do you?

Dr. SEAMANS. The Pacific Missile Range is used to a much less extent on our programs than the Atlantic Missile Range. However, some satellites require polar orbits and, consequently, we do have a few flights out of the Pacific Missile Range.

Dr. DRYDEN. We have had to build comparatively few facilities because there already exist launch stands for THOR-AGENA and ATLAS-AGENA built by the Air Force.

Mr. THOMAS. That is in the jurisdiction of the Air Force. You have a little bit of money in here for it, though.

Dr. DRYDEN. Not in this budget, but last year there was a little for the SCOUT complex there.

Mr. BOLAND. Do I understand this is the only area in which you can get a polar orbit? You cannot get one at Canaveral?

Dr. SEAMANS. You cannot without overflying South America.

(Off the record.)

OBLIGATION OF 1962 CONSTRUCTION FUNDS

Mr. THOMAS. How much money do you have in 1962? In round figures, with your transfers, it was $269 million or $270 million. How much of this has been obligated?

Mr. ULMER. $92 million on March 31 was under obligation.

Mr. THOMAS. How soon do you plan to get it under obligation?

Mr. ULMER. I believe all but $50 to $60 million will be under obligation by June 30.

FACILITIES WITH INITIAL 1962 FUNDING TO BE FULLY FUNDED IN 1963

Mr. THOMAS. What is the total of 1962 funds that you used to start projects that you really are going to fund in a substantial way in 1963? I notice on four or five different projects you listed a downpayment, so to speak, with 1962 funds. What is the total of that? Do you have that?

Mr. ULMER. They run about $30 to $40 million, Mr. Chairman.

Mr. THOMAS. Starting projects which you really will fund with 1963 money?

Mr. ULMER. Yes, sir.

Mr. THOMAS. How many are there?

Mr. ULMER. About a dozen.

Mr. THOMAS. Can you locate them quickly?

Mr. ULMER. I am omitting from this list now the land acquisition items which are in the same category. The first one is facilities for the F–1 engine program, facilities for the J–2 engine program, ground test facilities at Mississippi test facility, modifications to the Michoud plant, modifications to the west side of the existing SATURN static test stand at Marshall——

Mr. THOMAS. As well as I remember, there are three projects which were not even included in your 1962 budget, and you have made just a small downpayment on them.

Mr. ULMER. You are talking about projects that we initiated with the emergency construction authorization during 1962.

Mr. THOMAS. And you had all the authority you needed up to what?

Mr. ULMER. We had $30 million worth, Mr. Thomas, of the type that you can reprogram within the authorized construction program,

and in addition, up to 3 percent of the amount of the R. & D. and the S. & E. appropriation could be transferred and used for emergency construction purposes.

Mr. THOMAS. You had transfer authority of what?

Mr. ULMER. $36.3 million of that type, and $30 million of the reprograming type.

Mr. THOMAS. In another 30 to 40 days, for all practical purposes it will all be not only earmarked, but under firm commitments. As of about the 1st of March, they had committed, in round figures, only about $90 million of the $269 million. As far as transfer of funds is concerned, about three projects were not included in the 1962 budget, but they were within the transfer rights. Those transfer rights figured in the neighborhood of around $65 million.

SUPPLEMENTAL REQUEST FOR LAND ACQUISITION

Mr. OSTERTAG. I was wondering about the current situation with regard to the authorization of your supplemental. There were two projects, were there not, in the 1962 supplemental?

Dr. DRYDEN. Land acquisition.

Mr. OSTERTAG. I am talking about land acquisition.

Dr. SEAMANS. The Mississippi test facility for static testing and Cape Canaveral.

(Off the record.)

Mr. OSTERTAG. I am wondering if the situation is such that those projects should be included here, rather than in any supplemental. From the standpoint of time, it would not make much difference, would it?

Dr. SEAMANS. It makes a considerable difference to us, in that we are using our emergency authority for the land purchases. We are able to carry the purchase of the land by the corps for another month or so at Cape Canaveral. We have to make quarterly payments so they, in turn, can pick up the land parcels according to a schedule. This means these emergency funds are not available for other very pressing programs, and we have had to divert R. & D. funds from our development programs in order to do this.

Dr. DRYDEN. That is the emergency reprograming authority which is included in these figures. I may not be completely up to date on the legislative situation. As I recall, the Senate put these back in subject to the passage of the authorization by the Congress.

Mr. OSTERTAG. In the supplemental?

Dr. DRYDEN. Yes, sir. I take it the money is not available until the legislative committees pass the current authorization bill which, as I recall, has these amounts in it. Is that correct?

Mr. DEMBLING. The 1963 authorization bill will contain the land authorization. Your statement is correct.

Mr. OSTERTAG. Then it might make some difference, Mr. Chairman, from the standpoint of time, because it is reasonable to assume that if the supplemental is held up until the authorization is passed——

Dr. DRYDEN. I do not think they will hold it. They put in a provision this money is available upon passage of the authorization act. It is still in conference with the House at the present time, I believe.

Mr. OSTERTAG. Has there been a conference?

Mr. THOMAS. No.

(Off the record.)

Summary of Construction Programs

Mr. Thomas. Let us put CF S–1 and S–2 in the record. S–1 gives a summary of the entire NASA appropriation. CF S–2 breaks down the construction estimate. It shows for 1962, with your transfer, $269,356,000, against $818,998,000 for 1963.

These tables on 1963 programs will also be included in the record. That is S–3 through S–7. That gives the information by installation and projects.

(The pages referred to follow:)

Appropriation summary

	1961	1962	1962 supplemental	1963
Salaries and expenses	($170,760,000)	($206,750,000)		
Research and development	(670,453,000)	(1,220,000,000)	($85,000,000)	
Research, development, and operation	841,213,000	1,426,750,000	85,000,000	$2,968,278,000
Construction of facilities	122,787,000	245,000,000	71,000,000	818,998,000
Total	964,000,000	1,671,750,000	156,000,000	3,787,276,000

Summary of construction programs

	Fiscal year 1961	Fiscal year 1962		Fiscal year 1963
		Appropriated	Requested supplemental	
Ames Research Center	$545,000	$6,115,000		$14,439,000
Atlantic Missile Range	27,321,000	[1] 72,225,000	$55,000,000	359,963,000
Facility planning and design		5,154,000		10,000,000
Flight Research Center				1,807,000
Goddard Space Flight Center	9,500,000	9,180,000		23,780,000
Jet Propulsion Laboratory	8,531,000	3,580,000		10,360,000
Langley Research Center	11,957,000	6,530,000		8,092,000
Lewis Research Center	9,590,000	1,040,000		43,833,000
Manned Spacecraft Center		[2] 60,000,000		30,755,000
Marshall Space Flight Center	26,208,000	25,716,000		33,437,000
Michoud Plant		[2] 980,000		18,400,000
Mississippi test facility		[2] 10,090,000	16,000,000	92,500,000
Nuclear rocket development station		[2] 15,000,000		40,000,000
Pacific Missile Range	492,000	995,000		
Various locations	28,235,000	44,786,000		127,332,000
Wallops station	2,090,000	7,965,000		4,300,000
Total	124,469,000	269,356,000	71,000,000	818,998,000
Transferred from "Salaries and expenses"	−590,000			
Transferred from "Research and development"	−360,000	−24,356,000		
Transferred from Department of Defense	−1,070,005			
Reserve	338,005			
Total appropriation	122,787,000	245,000,000	71,000,000	818,998,000

[1] Includes $4,700,000 authorized under "Various locations."
[2] Included in authorization act under "Various locations."

Construction of facilities, 1963 programs

Location and project	Project estimate	Location total
Ames Research Center		$14,439,000
Location summary.		
Location plan.		
Bioscience laboratory	$924,000	
Mach No. 50 helium tunnel	1,500,000	
Radiative heat system for mass transfer facility	2,225,000	
Space flight guidance research facility	9,790,000	
Atlantic Missile Range		359,963,000
Location summary.		
Location plan.		
Existing area:		
Modifications to SATURN launch complex No. 34	3,765,000	
Modifications to SATURN launch complex No. 37	1,150,000	
Modifications to provide a launch complex for solid suborbital vehicles	1,717,000	
Supporting facilities	3,000,000	
Addition to assembly facility for unmanned spacecraft	2,000,000	
Explosive safe assembly facilities for unmanned spacecraft	450,000	
APOLLO mission support facilities	22,510,000	
Modifications to TITAN II launch complex	2,400,000	
Utility installations	800,000	
New area:		
Advanced SATURN launch complex No. 39	[1] 176,550,000	
Advanced SATURN-NOVA supporting facilities	39,121,000	
APLLO static test facility	5,000,000	
NOVA launch complex	[1] 79,500,000	
Utility installations	[1] 22,000,000	
Facility planning and design	10,000,000	10,000,000
Flight Research Center		1,807,000
Location summary.		
Location plan.		
Building additions	1,332,000	
Visual flight simulator	475,000	
Goddard Space Flight Center		23,780,000
Location summary.		
Location plan.		
Applied sciences laboratory	3,175,000	
Attitude control test facility	915,000	
Conversion of dynamic test chamber	3,250,000	
Development operations building	1,850,000	
Launch phase simulator	3,915,000	
Spacecraft operations facility	7,500,000	
Tracking and telemetry laboratory	3,175,000	
Jet Propulsion Laboratory		10,360,000
Location summary.		
Location plan.		
Addition to fabrication services building	605,000	
Data operations and command facility	2,420,000	
Engineering mechanics building	3,045,000	
Additions to materials research laboratories	610,000	
Telecommunications laboratory	2,860,000	
Utility installations	820,000	
Langley Research Center		8,092,000
Location summary.		
Location plan.		
Addition to heating plant	858,000	
Additional equipment for magnetoplasmadynamics research	1,450,000	
Additional power supply and improved arc chamber for 10-megawatt arc tunnel	760,000	
Environmental research facilities for spacecraft components and materials	997,000	
Particle accelerator for simulation of micrometeoroid impact	936,000	
Stabilization and control equipment laboratory	1,366,000	
Vehicle antenna test facility	1,725,000	
Lewis Research Center		43,833,000
Location summary.		
Location plan.		
Development engineering building	4,650,000	
Hydrogen heat transfer facility	2,400,000	
Lunar propulsion research facility	6,275,000	
Modernization and reconditioning of Plum Brook service facilities	1,508,000	
Nuclear rocket dynamics and control facility	3,500,000	
Space propulsion facility	25,500,000	
Manned Spacecraft Center		30,755,000
location summary.		
Location plan.		
Flight acceleration facility	10,630,000	
Thermochemical test facilities	6,000,000	
Lunar landing simulation facility	6,500,000	
Site development and utility installations	7,625,000	

See footnote at end of table.

Construction of facilities, 1963 programs—Continued

Location and project	Project estimate	Location total
Marshall Space Flight Center		$33,437,000
Location summary.		
Location plan.		
Addition to computation division building	$1,255,000	
Components test facility	[1] 4,000,000	
Components and subassembly acceptance building	950,000	
Engineering and administration building	2,500,000	
Expansion of instrumentation systems in west area	4,000,000	
F–1 engine test stand	[1] 4,500,000	
Hydraulic test facility	340,000	
Low-temperature facility	575,000	
Modification of west side of static test stand	[1] 2,000,000	
Engineering building	1,000,000	
Instrument laboratory	2,000,000	
Support facilities in west area	7,800,000	
Utility installations	2,517,000	
Michoud Plant		18,400,000
Location summary.		
Location plan.		
Modification to Michoud plant	11,400,000	
High-pressure test facility	1,000,000	
Hydrostatic test and cleaning facility	3,000,000	
Vertical assembly building	3,000,000	
Mississippi Test Facility		92,500,000
Location summary.		
Location plan.		
ADVANCED SATURN stage test facilities	[1] 36,000,000	
NOVA stage facilities	[1] 43,000,000	
Utility installations and support facilities	13,500,000	
Nuclear Rocket Development Station		40,000,000
Location summary.		
Location plan.		
Stage static test and maintenance facilities	20,205,000	
Stage demating, maintenance, and disassembly facilities	8,660,000	
Radiation effects facility	7,125,000	
Components test facilities	1,885,000	
Support facilities	2,125,000	
Various locations		127,332,000
Location summary.		
Advanced antenna system.		
Goldstone Station	14,250,000	
ADVANCED SATURN dynamic test facility	2,100,000	
Antenna facility, Johannesburg Station	5,000,000	
Antenna facility, Woomera Station	5,000,000	
Data acquisition facility, Far East Station	6,000,000	
Data acquisition facility, Rosman Station	3,500,000	
Facilities for F–1 engine program	[1] 25,000,000	
Facilities for J–2 engine program	[1] 4,000,000	
Facilities for M–1 engine program	[1] 16,000,000	
Manned space flight control centers	[1] 18,000,000	
Space radiation effects laboratory	12,382,000	
NOVA stage manufacturing facilities	[1] 16,100,000	
Wallops Station		4,300,000
Location summary.		
Location plan.		
Advanced data acquisition system	1,500,000	
Modification and expansion of range control, safety, and support systems and equipment	2,000,000	
Vehicle checkout facilities and equipment	800,000	
Total, 1963 program		818,998,000

[1] Incrementally funded project.

Ames Research Center

Mr. Thomas. Let us take these facilities in order by location. The first one is Ames Research Center at Moffett Field, Calif., 35 or 40 miles out of San Francisco. I have two items checked. We have discussed the helium tunnel, $1.5 million and the space-flight guidance research facility $9,790,000.

Put CF1–A1 in the record.

(The page referred to follows:)

Ames Research Center

Location plan:	
Bioscience laboratory	$924,000
Mach No. 50 helium tunnel	1,500,000
Radiative heat system for mass transfer facility	2,225,000
Space-flight guidance research facility	9,790,000
Total	14,439,000

BIOSCIENCE LABORATORY

Mr. THOMAS. Let us put page CF1–A3 in the record. This is very technical and deals with your bioscience laboratory, $924,000. We will also put in the cost figure which is found at the bottom of page CF1–A5.

(The pages referred to follow:)

BIOSCIENCE LABORATORY, AMES RESEARCH CENTER

DESCRIPTION

A bioscience laboratory is proposed for construction to provide the research facilities, offices, and support functions for systemic and subsystemic research in the separate but related fields of immunology and genetics, radiobiology, and exobiology. The laboratory structure will provide approximately 26,900 square feet of space in the general arrangement shown in the sketch on the next page.

JUSTIFICATION

Life sciences, from the space point of view, comprise the functions involved in the basic biological exploration of space and those areospace medicine activities required for manned space flight. The proposed facility is necessary to permit a modest in-house capability to be acquired in the area of space biology similar to the manner in which in-house capability has been provided for other scientific disciplines in the physical and engineering sciences. Aerospace medicine activities, as such, will not be conducted in the facility although limited specialized investigations may be undertaken in physiological and behavioral sciences. Necessary data in the areospace medicine field will be acquired by grants and contracts with universities, or contracts with industry, and by use of the extensive aerospace medicine facilities already in existence at various Department of Defense installations.

The research programs to be conducted in the proposed facility will concentrate on the mechanisms underlying biological phenomena of hypersensitivity, immunological paralysis and immunological tolerance, and how the space environment interacts with these responses. The genetic basis of individual differences in responses to particle radiation will be investigated. The responses to particle irradiation will be studied at the organismal, tissue, cellular, subcellular, and molecular levels.

These studies require basic research in the fields of immunogentics, immunochemistry, classical, cellular, and molecular genetics, and radiobiology. The research will be designed to use the unique features of the space environment, such as heavy particle irradiation and weightlessness, as research tools. The evolution of immunological and genetic systems will be studied in reference to their possible presence and state of development on extraterrestrial bodies. Emphasis will be on in-house experimentation to provide the competence to monitor contractual efforts. An operationally flexible laboratory building with facilities for prolonged experimentation is therefore planned.

A brief description of the major research areas to be pursued follows:

(*a*) Genetics: Research will be carried out on the effects of particle irradiation on genetic systems in bacteria, fruit flies (Drosophila), and inbred mice. The mechanism of genetic change will be studied at the cellular and molecular level.

(*b*) Immunogenetics: Research will be performed on the mechanisms involved in the determination of immunologically specific, genetically controlled, reactions, and the effects of the space environment on these reactions.

(*c*) Radiobiology: Research on the basic reactions between ionizing radiation and living material will be studied, especially in reference to the heavy and highly energetic radiations found in space.

(*d*) Exobiology: The functional organization of genetic systems will be studied to understand their evolution and to correlate terrestrial systems with those to be found on extraterrestrial bodies. The analysis of organic materials found in meteorites will be carried on and integrated with other studies on the presence and evolution of life systems in the universe.

Cost estimate

(*a*) Land acquisition	-------
(*b*) Site development and utility installations	$57,200
Streets and parking area	37,200
Utility connections	20,000
(*c*) Facility construction and modifications	709,700
Building (26,900 square feet at $26.40 per square foot)	709,700
(*d*) Equipment, instrumentation, and support systems	107,100
Special built-in equipment, cold boxes, vacuum pumps, and sterilizers	42,350
Laboratory equipment	44,750
Office furniture	20,000
(*e*) Design and engineering services	50,000
Total estimated cost	924,000

Mr. THOMAS. You have no land acquisition cost.

You have a building here of 26,900 square feet at $26.40 a square foot. Then the rest of it is in equipment and design and engineering cost, totaling $924,000.

NUMBER OF BIOSCIENCE LABORATORIES

How many of these bioscience laboratories do we have? Have we not two others besides this one?

Dr. DRYDEN. Do you mean NASA, or the country generally?

Mr. THOMAS. No, the Space Agency.

Dr. DRYDEN. This is the only facility of this type, a bioscience laboratory. There are facilities in manned space flight connected with astronaut preparation for flight, and that sort of thing, but this comes under the Office of Space Sciences. Dr. Newell, do you want to say a word about this?

Dr. NEWELL. Yes.

NATURE OF BIOSCIENCE ACTIVITIES

This facility is for support of space biology. It is not devoted to aerospace medicine, but to fundamental sciences. There are four words here for the work that will go on: Genetics, immunogenetics, radiobiology, and exobiology. The activity here will support our space science investigation and search for extraterrestrial life.

Mr. THOMAS. Doctor, why should we get into this field? We have installations all over the country dealing with this subject. Can you

not go to the universities and pay for this and pay at least 15 cents on the dollar what you will have to spend?

Dr. NEWELL. I think not. We have made careful checks of the activities of the various facilities.

Mr. THOMAS. The Air Force has this type operation and FAA wants to go into this business.

Dr. DRYDEN. In aerospace medicine, we are using and will use the facilities of the School of Aerospace Medicine at San Antonio. As you know, Mr. Chairman, there is at San Antonio a research group in aerospace medicine unequaled in the world, I think, in their knowledge of the physical conditions and responses of pilots and astronauts.

We have agreed that this group will do the medical evaluation of all astronaut candidates and will be active in their preliminary indoctrination into high altitude operations.

POSSIBLE USE OF OTHER FACILITIES

Mr. THOMAS. The only point we are raising is that we have fine medical colleges all over the country, and this is right up their alley. In the first place, before you get through, including the equipment, the building will cost $924,000. It would at least save $26.40 a square foot for about 27,000 square feet. Can you not go to these fine medical schools? Are they not anxious to get into this type of work for you?

Dr. DRYDEN. This program will involve the cooperation of a large number of universities, but NASA is involved in the flight programs, and we need some people who know something about this work and who know good work when they see it.

Mr. THOMAS. You will be into it more than anybody, as far as tests with the human body.

Dr. DRYDEN. Over 90 percent of this budget is spent completely outside NASA, not for people within NASA.

Mr. THOMAS. The point we are raising is, Can you not go to the existing facilities in the Air Force and have them do this work, without building another building?

Dr. DRYDEN. I do not think so.

Mr. THOMAS. Are you close to a medical college here?

Dr. DRYDEN. Yes, several of them.

Mr. THOMAS. Where?

Dr. DRYDEN. University of California at Berkeley, and Stanford University.

Mr. THOMAS. Forty miles away. I guess that is close.

Mr. BOLAND. Why cannot these schools do the work on genetics which you talk about on page CF1–A5?

Dr. DRYDEN. They will do most of it.

Mr. BOLAND. Why do you need this facility, then?

Dr. DRYDEN. If the Government is to contract for work of this kind, it needs some people to know what it is about. Otherwise, it is a case of the blind leading the blind.

Mr. BOLAND. Do you have the figure in mind at the moment for this total program in extraterrestrial life and space biology?

Mr. THOMAS. I do not think we know anything about it, and we should before we sent a man up and keep him up 18 or 20 days, or even 3 or 4 days.

Dr. DRYDEN. We want enough capability to manage it intelligently. That is all I am trying to say.

Mr. THOMAS. Can you not go to existing medical schools where there are the brainpower and experts and get them to do it for you cheaper than you can do it for yourself?

Dr. DRYDEN. Not in the management of the whole program. You go to them for a specific project or for planning a specific set of experiments, but the job that our group has to do is to plan the whole program in this area in which NASA will be providing the launch vehicles and coordinating the preparation, just as we do with Van Allen's work.

SPACE FLIGHT GUIDANCE RESEARCH FACILITY

Mr. THOMAS. Let us put D–1 and the cost table on D–11 in the record.

(The material referred to follows:)

SPACE FLIGHT GUIDANCE RESEARCH FACILITY, AMES RESEARCH CENTER

DESCRIPTION

Construction of a simulator is proposed to undertake research to obtain the information necessary to the integrated design of the guidance, stabilization, control, and crew support systems in advanced manned spacecraft, such as APOLLO. The simulator will provide, within earth-based limits, a realistic simulation of the environment, accelerations, motion, and tasks for crew and equipment within a representative space capsule during takeoff, midcourse flight, entry, and landing.

The proposed facility will consist of three major elements:

(*a*) A representative three-man space capsule containing the crew life-support system; the navigation, guidance and control equipment and such environmental conditions as can be represented with adequate realism; and the instrumentation necessary to present to the crew a realistic representation of the navigation problem.

(*b*) A computer which will be capable of accepting inputs from the capsule and crew and of converting these inputs into appropriate capsule motion commands and visual presentations. To provide acceptable computer accuracy, it is expected that analog and digital computer techniques will be required in a combined operation.

(*c*) The support and drive mechanism for the capsule, consisting of a rotating centrifuge arm on which the capsule is mounted, a vertical travel mechanism for the capsule, a gimbal system and drive mechanism capable of rotating the capsule in complete freedom about the three axes, and a mechanical brake for simulating the impact decelerations of landing.

The capsule will be suspended so that it has unlimited motion about three axes: roll, pitch, and yaw. The associated electric or hydraulic drive motors would be mounted on the pitch gimbal, yaw gimbal, and outer frame, respectively. The gimbaled system capable of vertical movement will be attached to the centrifuge arm and will be supported vertically by fluid guides. The centrifuge arm may be driven by a single or multiple electric motors operating through multiple chain drives. The simulation of impact decelerations will be accomplished by a mechanical brake or negative torque input.

The centrifuge arm drive system will be capable of centrifugal onset acceleration rate of 5g per sec to a maximum of 50g, will be capable of maintaining the 50g loading for a minimum of 10 minutes and will be capable of a 5g per sec deceleration rate. Below a peripheral speed of 60 feet per second the brake will be able to decelerate the centrifuge arm in a manner equivalent to an impact landing. With regard to design and construction, although the described system consists of a number of fairly well proven subsystems (such as the chain drive and mechanical brake), the required acceleration rates in combination with the

required dynamic response result in large structural and drive system loads. Due to these extreme requirements aggravated by gyroscopic effects, a thorough engineering study will be required to determine the feasibility of various approaches.

A circular room about 130 feet in diameter with special foundations will house the simulator. Associated medical, equipment, shop, and control areas will be included in a new building adjacent to the circular room. Office space for professional operating personnel is currently available.

Combining the operation of these three elements will make it possible to examine realistically, with one exception, the most important research problems associated with the interrelation of the elements, mechanical, electrical, optical, and physiological, of the space flight mission from takeoff to landing. The one exception is, of course, the question of weightlessness during midcourse flight which cannot be reproduced acceptably under laboratory conditions. To minimize the effects of earth gravity during midcourse simulation, it is proposed to hold the crew attitude close to that judged most nondistracting, to provide rotational acceleration cues by means of washout controls (initial cue followed by angular-acceleration fadeout so that little motion results), and to provide important attitude cues by visual presentation. The centrifuge arm will supply the moderate vertical and longitudinal acceleration cues associated with midcourse corrective action. Because the midcourse accelerations will be small, it appears entirely possible to mount the proposed capsule on the existing Ames centrifuge equipment for this purpose, and early construction of the capsule and gimbal will allow research to be expedited. It is impractical, however, to consider combining the proposed capsule and the existing Ames centrifuge to study launch, abort or reentry.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$350,000
Utility connections, parking lots, and roads	$90,000	
Electrical connections and distribution system	260,000	
C. Facility construction and modifications		7,340,000
Centrifuge system	2,880,000	
Vertical drive	660,000	
Programed braking device	220,000	
Fluid bearing	620,000	
Three-degree-of-freedom drive	400,000	
Three-degree-of-freedom gimbal structure	550,000	
Capsule structure with internal controls	450,000	
Centrifuge controls	440,000	
Capsule external controls (less navigation instrumentation)	435,000	
Buildings	685,000	
Main centrifuge area and foundations (17,500 square feet at $22 per square foot)	385,000	
Control room and support building (12,800 square feet at $23.44 per square foot)	300,000	
D. Equipment, instrumentation, and support systems		1,450,000
Navigation equipment, optical instruments, and simulated display equipment	750,000	
Digital-analog computer conversion equipment	700,000	
E. Design and engineering services		650,000
Preliminary design	250,000	
Final detailed design	400,000	
Total estimated cost		9,790,000

SCOPE OF GUIDANCE RESEARCH ACTIVITIES

This is space flight guidance research facilities. What is the connection between these two?

Mr. DIXON. I would like Dr. Kelley to discuss that.

Mr. THOMAS (reading):

> This project requests funds for the construction of four support facilities * * *. Three engineering and laboratory type facilities * * *.

Is there any connection between this project and the bioscience laboratory?

Dr. KELLEY. There is no direct connection. This is a manned simulator in which we can put a three-man crew and simulate the complete mission.

Mr. THOMAS. That is completely what prompted me to ask you the question. Now reading further, you use this language:

> Construction of a simulator is proposed to undertake research to obtain the information necessary to the integrated design, guidance, stabilization control, and crew support system for the advanced APOLLO.

What connection is there between this and that other laboratory?

Dr. KELLEY. This is a general research facility for manned space flight. It has application to missions such as APOLLO. This is a research facility in which we can try different types of instrumentation, different types of control equipment, different crew configurations and workloads. The Houston facility is an operational and training facility directly in support of APOLLO.

Mr. THOMAS. This has nothing to do with health. Let us put it in language we can understand.

Dr. KELLEY. This hasn't anything to do with health. This is equipment and facilities to work with the man.

RELATION TO HUNTSVILLE FACILITY

Mr. THOMAS. Dr. Hausermann at Huntsville is your control and guidance expert. Why build this at this particular location? You are sure it has nothing to do with health?

Dr. SEAMANS. That is correct.

Mr. THOMAS. This is guidance and control. Gentlemen, you have existing facilities right at Dr. Hausermann's shop at Huntsville now. Is this a duplication of what Hausermann is doing?

Dr. SEAMANS. Hausermann is involved in launch vehicle guidance, unmanned guidance. This is concerned with the role the crew have in the flying of this space vehicle. It is just like flying an airplane. They need instruments; they need a control stick—rudder pedals, only brought up to date for space flight.

Mr. THOMAS. That is Mr. Hausermann's field, is it not?

Dr. DRYDEN. No. He is making the guidance for the launch vehicle, the gadgetry that puts the spacecraft in orbit.

Mr. THOMAS. Where was this problem worked out for Glenn and his predecessors?

Mr. WYATT. We did not have this problem with Glenn, sir, because he did not in fact navigate or guide. All he did was control the stabilization of the spacecraft in terms of whether it pitched or yawed or rolled. Here we are talking about much more ambitious maneuvers in which they actually fly the spacecraft and have to consider navigation as well as stabilization and guidance throughout a space mission—in other words, in which the crew becomes a part of the guidance system and you use man's capacity to augment and supplement the purely mechanical systems of the sort we have on the MERCURY flights.

Mr. THOMAS. Did I see a little money for the same proposition in your unmanned projects in Virginia?

Dr. KELLEY. Not this type. That has to do with the stabilization and control equipment laboratory at Langley, but not manned guidance and control research.

NATURE OF RESEARCH ACTIVITIES

Mr. THOMAS. Is this laboratory one where you can draw a line and everything on this side is white and everything over here is black? What is the difference between the two theories? What about it, Mr. Dixon? Some of your scientists ought to be able to speak a little ordinary language.

Mr. DIXON. Mr. Chairman, this facility permits us to simulate on the outer arms which you see on the next page. I think we might describe it a little bit.

Mr. THOMAS. We have been in your facility. What are you going to build that you do not already have there now?

Mr. DIXON. We do not have a facility in which we can put a spacecraft and also simulate the guidance problem, where these men actually operate this facility and simulate taking a whole trip, say, to the Moon or to Mars and see how the whole guidance and electronic equipment operate. We are using man and all of this guidance equipment together, and doing research in that manner to prove out some of the new guidance equipment that we are studying.

You must use this type of machine to simulate, say, three degrees of freedom.

Mr. THOMAS. Who is making your guidance equipment?

Mr. DIXON. In this case, some of this equipment will come from industry. Some of our equipment will come from the Manned Spacecraft Center.

Mr. THOMAS. You are operating in unplowed ground, are you not?

Dr. DRYDEN. I think the essence of it is that this is a considerably larger facility than any that are available. We have made some experiments——

Mr. THOMAS. You have to make all your equipment and tools and fashion your own instruments right here, do you not?

Dr. DRYDEN. Exactly.

Mr. THOMAS. How can industry do this job?

GUIDANCE RESEARCH ON MANNED AND UNMANNED VEHICLES

Mr. DIXON. We will be testing industry's guidance equipment. This is a unique facility in that it is the only place you can test this and simulate these types of spaceflight conditions.

Mr. THOMAS. I understand Dr. Hausermann has the finest in the world.

Mr. DIXON. He has an excellent guidance laboratory. He is interested in guiding the launch vehicle. This is concerned with the space flight, the space capsule.

Mr. THOMAS. Dr. Hausermann has been working in this field for 15 years.

Dr. SEAMANS. He is an extremely able gentleman and we are fortunate to have him and his team. However, he has not been involved

in the guidance of manned vehicles. He started out with missiles, boosters, and now he is involved in the launch vehicle guidance, but not in the guidance problems associated with a crew taking the capsule to the moon and ultimately to the planets.

Mr. THOMAS. You have to depend upon the guidance people, the individuals. The building will not make the program work. It will be the brains. What are you going to do with him all this time?

Dr. DRYDEN. He still will be working on guidance components. He does not have the responsibility of guidance of spacecraft but only that of space vehicles, which is different. Guiding rockets into orbit is different.

I do not think we are getting the size of this thing over to you. This carries the APOLLO capsule with three men in it. The crew sitting in this thing can go through a simulated mission.

Mr. THOMAS. You have a fine description in here.

Dr. SEAMANS. It is a flexible facility. We can try out concepts for APOLLO, and can equally well adapt it to other missions. It is a research tool as compared with the development facilities we have for Marshall and the Manned Spacecraft Center.

Dr. DRYDEN. The actual guidance systems may come from industry, from Marshall.

Mr. THOMAS. Are all the efforts of industry to be tested right here?

Dr. DRYDEN. Any that we use will certainly go through this facility.

Mr. THOMAS. What about the others? Have you similar facilities?

Dr. SEAMANS. Once a mission is defined and we are developing a capsule for a particular job we will use the facilities at the Manned Spacecraft Center and at Marshall primarily for development work. This is at the stage when we are still considering new missions. We are trying out various concepts to see whether these missions are feasible or not.

Mr. OSTERTAG. New missions over and above the current mission?

Dr. SEAMANS. Yes. We are considering various kinds of future missions—space stations in orbit around the earth, for example.

RESEARCH IN CONNECTION WITH APOLLO

Mr. OSTERTAG. The original APOLLO mission is one of the items I have in mind. What are you doing in research connected with that now?

Dr. DRYDEN. As of the present moment we are using every facility that we can find which will give us some limited information at the boundaries we have to explore.

We are and we will continue to make some tests in the facilities at Johnsville, Pa., owned by the Navy. There is a somewhat smaller device at Wright-Patterson Air Base we have used and will continue to use. None of these are of the size and flexibility of this.

Mr. OSTERTAG. That can be understood.

BASIS OF COST ESTIMATE

Mr. THOMAS. Assuming this is all construction and engineering money, how do you arrive at these figures on this untried and untested material? How do you come up with a figure like that?

Dr. DRYDEN. This is largely on the basis of experience of our engineers in designing new and untried equipment.

Mr. THOMAS. The only item where you can come up with any set degree of accuracy is in the big building to be used for housing the equipment. You have a total cost of almost $10 million. One of the big items in the cost is the building.

Dr. DRYDEN. The buildings are $685,000 of this total $10 million.

Mr. THOMAS. That is the smallest item in it.

Dr. DRYDEN. That is right. The biggest amount is for the centrifuge system itself, a 50-foot arm with a cab and bearings.

Mr. THOMAS. Wrap it all up and call it construction and modification.

Dr. DRYDEN. That is right.

Mr. DIXON. The equipment is the largest item. We have a whirling arm, drives, braking, and mechanism to move this up and down with three degrees of freedom, and then the building portion which is very small.

AIRCRAFT SIMULATOR FACILITY

Mr. THOMAS. You have a small facility out there now, have you not?

Dr. DRYDEN. That is right, and it is on the basis of having built that that you get some idea as to what these things cost.

Mr. EVINS. You don't call it a little facility, do you, Mr. Chairman?

Dr. DRYDEN. Compared with this one it is.

Dr. SEAMANS. It is that experience which permits us to grow.

Mr. THOMAS. Is that the only one you have in the entire space setup now?

Dr. SEAMANS. That is the largest and only one we have for manned flight simulation.

Dr. KELLEY. That is an aircraft simulator. We have jury-rigged it for some space problems.

Mr. THOMAS. What was the thinking to put an installation such as this there at that location?

Dr. DRYDEN. These are the people who dealt with the manned airplane control characteristic problems. They worked out the X–15 manned machine loop. The earlier centrifuge you are talking about was built primarily for the investigation of high-speed aircraft problems by putting a man in the device, subjecting him to acceleration, and simulating the aircraft response and aircraft controls.

As Dr. Kelley says, we have been using that to try to rig up space problems. It is from that experience and from that group that we get the decision——

Mr. THOMAS. Who is in charge of this program?

Mr. DIXON. Dr. Harper is in charge of this portion. He works for Dr. DeFrance.

Mr. THOMAS. Which one is Dr. Harper?

Dr. DRYDEN. You met Harper in the full-scale wind tunnel.

Mr. THOMAS. He is with DeFrance?

Dr. DRYDEN. That is right.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

Mr. THOMAS. You have been working in this field for a long time, Dr. Dryden.

Dr. DRYDEN. That is right.

DESIGN AND ENGINEERING SERVICES

Mr. THOMAS. All right. Can you do this job here for about $12½ to $13 million?

Dr. DRYDEN. You mean this $10 million job?

Mr. THOMAS. No; you show about $14.5 million for the entire Ames Research Center. You have four items there and it all involves construction. You will do about 90 percent of it inhouse outside of the building.

How much money do you have for engineering fees and to whom do you pay them? Is this the Corps of Engineers?

Dr. DRYDEN. No, sir.

Dr. SEAMANS. These are not under contract as of now.

Mr. THOMAS. You have your design engineering fees set up for $650,000 for the space flight guidance research facility.

Dr. DRYDEN. That is right.

Mr. THOMAS. Is this the Corps of Engineers?

Dr. DRYDEN. No.

Mr. THOMAS. What is the leadtime on this? How long will it take to construct?

Dr. KELLEY. Twenty-four months for the guidance facility.

Mr. THOMAS. You have your own engineers but you have $650,000 set up for design and engineering services. You have to rely on your own crowd. Nobody else knows anything about this. You are not going to spend $650,000 for engineering when you already have the engineers.

Dr. KELLEY. Our people develop specifications. This work requires specialists to translate our requirements into actual hardware. We are trying to simulate a flight environment on a whirling arm and there are various construction problems here where we do not have the inhouse capability.

Dr. SEAMANS. We can lay out the total facility.

Mr. THOMAS. You can do the hard part but not the easy part.

Dr. SEAMANS. We haven't the manpower.

Dr. DRYDEN. That is right. We cannot run a drafting and design bureau for all the details. We can lay out the broad lines of it and the specifications.

Mr. THOMAS. What is in that big building you have there? You have 75 to 100 draftsmen there.

Dr. DRYDEN. I don't think so.

Dr. SEAMANS. At Ames? I doubt it very much.

Mr. DIXON. This requires rotating machinery type people to design this equipment. We want to be sure it works, and it will pay us to get these types of specialists through an A–E type organization to really design this properly so that when we do put it out for bids and fabrication and it comes back it will work properly. That is the purpose of this $650,000. We want good preliminary design and then the final detailed design of the facility.

This is a very intricate facility to do all the things we want to simulate the flight in space. It has a big arm there. You are rotating a tremendous amount of weight. We do want to be sure it works properly.

MANPOWER FOR FACILITIES

Mr. OSTERTAG. In a general sense this may not apply wholly to the Ames Research Center any more than to others.

A number of things are going through my mind with regard to the tremendous expansion going on here. We are dealing with facilities, speaking generally. It is only a physical aspect of the entire program rather than operation.

Dr. Dryden, you mentioned a few moments ago that a great part of this money is spent outside of NASA. These are facilities that will be operated by NASA. It will be research carried on by NASA.

Dr. DRYDEN. That is right.

Mr. OSTERTAG. It is difficult for me to figure out just where you will obtain the people of scientific background to man a facility the size of this, along with many others that you have programed right now.

Can you give us some notion about that?

Dr. DRYDEN. We have made some manpower projections.

Dr. SEAMANS. We show the Ames Research Center will grow by approximately 375 people in fiscal year 1963 if we are to expand the effort according to these lines and take on life science work and do the other work that we are assigning to the Ames Center.

Mr. OSTERTAG. This facility is yet to be constructed. If this is budgeted and programed when will this facility be completed?

Dr. SEAMANS. This facility is an integral part of a research program designed to better our understanding of the dynamic performance of man and machines.

Mr. OSTERTAG. I am trying to get the timetable.

Mr. THOMAS. Twenty-four months.

Mr. OSTERTAG. In other words, you would man it as you go along?

Dr. SEAMANS. Yes. The machines themselves do not do any good unless you have the competence to use the equipment properly, so we will be expanding the manpower.

Dr. DRYDEN. We have shut down wind tunnels. I know this is difficult to believe.

GENERAL BUDGETARY PROJECTIONS OF SPACE PROGRAM

Mr. OSTERTAG. You have an ambitious program from the standpoint of construction and development. Yet a few days ago we were discussing the general growth, expansion, and budgeting of the Space Agency. I believe it was estimated some $35 billion would be expended within the next 10 years.

Will this be just one-tenth of the total growth of NASA from the standpoint of construction and facilities?

Dr. DRYDEN. There is much more construction this year than I would expect the annual rate to be in a few years because of the whole impact here of a new launch site associated with lunar launching. We are starting facilities for building large rockets, test stands, these items certainly will not continue during the 10 years.

Mr. OSTERTAG. But the anticipated expenditures are even greater than they are this year.

Dr. DRYDEN. That is correct.

Mr. OSTERTAG. Where do you expect that will be in the form of operations and personnel?

Dr. SEAMANS. Development costs will go up because we must purchase the spacecraft and launch vehicles required for missions that will take place in 1966, 1967, and 1968.

Mr. OSTERTAG. This is a substantial amount of your budget and it is all for facilities. Yet that will not be a normal 10-year requirement. Is that true?

Dr. DRYDEN. There will be more money in Research and Development and less in facilities as this program moves forward.

INCREASES IN PERSONNEL

Let me try to answer your question in general terms. Looking at the projection of manpower in this 10-year period, we have made some wild guesses. Right now we have authorized at the end of 1962, 21,880 total, of which I would guess offhand—I would like to get the exact——

Mr. SIEPERT. 7,700 scientific and professional in that total.

Dr. DRYDEN. The rough guess is that that figure might climb to 30,000 to 35,000 people in this 10-year period, and the 7,500 to 7,700 might climb to 10,000, or so, scientific and professional people.

I cannot tell you exactly what is happening to other people. I know we have been amazed to find that we have substantially reached the end of 1962 figure from this recruiting program with no sweat at all. Here by the first of May we have recruited all the people we need to reach the end of the year complement. About half of them come from industry. There are a number from universities, and a few from——

Mr. THOMAS. I am glad you clarified that for Mr. Ostertag and the rest of us.

CONSTRUCTION AND RESEARCH AND DEVELOPMENT

The probabilities are that your construction program should go down but your research and development inevitably will go up.

Dr. DRYDEN. That is right.

Mr. THOMAS. From the research and development you get the prototypes as well as future research.

Dr. DRYDEN. I don't want to be misunderstood. You will notice in the summary table that a number of these very expensive items at Cape Canaveral and the Mississippi test facility are incrementally funded, so there will be a period of 2 or 3 years where this facility funding budget will be high.

Following this initial construction period we would expect the facility item to go down and the research and development to climb as you buy big boosters and spacecrafts.

Mr. THOMAS. What about the five items? Will the $14.5 million complete the cost here or will that be a downpayment?

Can you handle the five items for $12.5 million?

Dr. DRYDEN. You ask me each year if we can build it for 10 percent less.

Mr. THOMAS. We are making it 12 percent this year. Can you do it? You have always done it for 10.

Dr. DRYDEN. My answer has to be as in the past—you cannot build exactly these same things for 10 percent less.

I think it is fair to say we have built within the sums you have allowed us.

Mr. THOMAS. That is your statement. Let me follow up with mine. You are not admitting you have been doing second-rate work, are you?

Dr. DRYDEN. No. Sometimes we have had to curtail——

Mr. THOMAS. You have had no dissatisfied customers, have you? Your scientists have all been pretty well satisfied?

Dr. DRYDEN. It is fair to make the statement to you that I have made before. Congress has heard our requests in very sympathetic fashion. You have not always given us everything we asked for. We have lived within what you have given us. We shall continue to do the same.

ATLANTIC MISSILE RANGE

Mr. THOMAS. Let us look at Atlantic Missile Range, CF2–A1. This is the big one, about $360 million. This table breaks it down very well.

You have 14 or 15 projects as I recall it. The big one is the advanced SATURN complex, $176 million, and the NOVA complex for $79.5 million. The APOLLO program is $22.5 million. Those are the three large ones. Put the summary sheet, CF2–A1, in the record.

(The page refererd to follows:)

ATLANTIC MISSILE RANGE

Construction of facilities, 1963 program—Location plan

Existing area:	
Modifications to SATURN launch complex No. 34	$3,765,000
Modifications to SATURN launch complex No. 37	1,150,000
Modifications to provide a launch complex for solid suborbital vehicles	1,717,000
Supporting facilities	3,000,000
Addition to assembly facility for unmanned spacecraft	2,000,000
Explosive safe assembly facilities for unmanned spacecraft	450,000
APOLLO mission support facilities	22,510,000
Modifications to TITAN II launch complex	2,400,000
Utility installations	800,000
New area:	
Advanced SATURN launch complex No. 39	176,550,000
Advanced SATURN–NOVA supporting facilities	39,121,000
APOLLO static test facility	5,000,000
NOVA launch complex	79,500,000
Utility installation	22,000,000
Total	359,963,000

TIMING OF CONSTRUCTION PROJECTS

Mr. THOMAS. In point of time, will these be building simultaneously?

Mr. HOLMES. Building them simultaneously, that is certainly so. It is true, however, that the $22.5 million represents a full payment whereas the other two items are downpayments. Those are major endeavors.

Mr. THOMAS. I believe you set it out that it runs about 35 percent of the total cost. We shall get into that in a moment. Is it necessary to build all three of these simultaneously?

Mr. HOLMES. It is in order to meet our schedules. They are quite different. We have APOLLO mission support facilities which are just that. They are support facilities rather than actual facilities for launching of vehicles.

Mr. THOMAS. Then you have SATURN, NOVA, and APOLLO facilities.

Mr. HOLMES. Those are located on the new land acquisitions. APOLLO mission support facilities designated here will also be in the new area—not the existing area as shown in the book.

NOVA AND SATURN SUPPORT FACILITIES

Mr. THOMAS. Is it possible from a scientific or engineering point of view to build one facility to take care of all three?

Mr. HOLMES. For both technical and the support facilities it would be highly inefficient. In the old area we are adding to these facilities in order to immediately accommodate the current increase in workload. There really is not room there to add the major industrial facility which we plan to start to support the entire new area.

Mr. THOMAS. This is on the new land?

Mr. HOLMES. That is right. Further, by being on the new land it is in a much better location.

Mr. THOMAS. You will have NOVA and ADVANCED SATURN on the new land?

Mr. HOLMES. That is right.

Mr. THOMAS. Can you build one facility to take care of both of them?

Mr. HOLMES. One industrial facility on the new land can take care of both of them.

Mr. THOMAS. How much money do you have for the new projects? You have the NOVA complex—$79.5 million.

Mr. HOLMES. That is right.

Mr. THOMAS. And the ADVANCED SATURN for $176 million. Then there is the ADVANCED SATURN-NOVA facility for $39 million. Right there you have around $300 million.

Mr. HOLMES. Yes, sir.

Mr. THOMAS. Can you combine them. That is what I am asking you. Is it feasible to build one facility and serve them both?

Mr. HOLMES. No. Indeed these are three quite different things. To start with, the ADVANCED SATURN complex for the $176 million includes our vertical assembly building, transfer system, and launch pads. Also included is equipment and instrumentation for the initial phase. This is where we assemble the missiles, how we transport and fire them.

The NOVA complex is similar except it is less of an initial payment. This is shown for the $79.5 million.

The supporting facility is just that—the support type facilities for operations in the new area.

Mr. THOMAS. We understand all that, Dr. Holmes. The question is whether you can build one big facility and have all the support you need and use it for SATURN and NOVA. Is it feasible economically? Is it feasible from an engineering point of view?

Mr. HOLMES. The industrial support, no. The industrial support, where you house people, where you have draftsmen, test facilities, is separate completely from the vertical assembly buildings, transfer system, and launch pads. It would not be feasible to have them all in one location.

Mr. THOMAS. Why?

Dr. DRYDEN. This industrial area corresponds to a hangar way off in the back of the field where the stuff is brought in and put together and tested. The launch complexes correspond to the test stands. You cannot combine the two.

Mr. THOMAS. They will not mix?

Dr. DRYDEN. That is right.

Mr. OSTERTAG. You are combining SATURN-NOVA support facilities.

Dr. DRYDEN. As far as hangars, offices, test facilities which correspond to the present area at Canaveral where all the hangars are.

Mr. OSTERTAG. That is Mr. Thomas' point.

Dr. DRYDEN. They are combined.

Mr. OSTERTAG. General support facilities could be made available to the program more efficiently and perhaps more economically.

Dr. SEAMANS. Those have been combined. That is the item for $39 million.

Mr. HOLMES. Cable storage and maintenance facilities, contractors buildings, engineering laboratory.

TOTAL COST OF NOVA COMPLEX

Mr. THOMAS. You use the word "complex." Can you combine the complex for NOVA and the complex for advanced SATURN?

Dr. DRYDEN. No, sir.

Mr. THOMAS. Why?

Mr. HOLMES. To do it one would have to build the ADVANCED SATURN complex of at least 50 feet in diameter rather than 33 feet. To our minds today we would have to build it so large to accommodate advances in design that will come about in the NOVA that it will end up being inefficient and more expensive.

Mr. THOMAS. I don't see how it can be. I have a note here that the $79,500,000 will be about $230 million before you get through with it.

Mr. HOLMES. $457 million.

Mr. THOMAS. How did I make such a mistake as that?

Mr. OSTERTAG. The whole NOVA complex?

Mr. HOLMES. That is right.

Mr. THOMAS. Where did you get your figure?

Dr. DRYDEN. Start with page CF–2–M1.

Mr. THOMAS. Total cost $230 million. Where do you get your figure of $457 million? I have a longhand note here.

Dr. DRYDEN. You got yours from M–1 where there is a statement that the fiscal 1963 request covers approximately 35 percent of the total.

Mr. HOLMES. That is right, and that should be 17 percent.

Mr. THOMAS (reading):

> It is estimated that the fiscal year 1963 request covers approximately 35 percent of the total cost of the complex.

That is where I got my figure.

Dr. DRYDEN. That should be 17 percent.

Mr. HOLMES. That is a typographical error and should be 17 percent. Your figure was right according to the way it was printed.

I would not want to mislead you. It is $457 million.

DISADVANTAGES IN COMBINING COMPLEXES

Mr. THOMAS. Let us talk about combining these complexes, then. Let us go back to the combination here.

Mr. HOLMES. All right. If we combined them, then we would have several disadvantages. One is that we must go ahead very rapidly with the ADVANCED SATURN. We have that vehicle pretty well defined now and under contract. This is not so in the case of the NOVA. We would have to build a building much larger than presently planned because our estimate guess is that the NOVA will have a diameter of 50 feet——

Mr. THOMAS. You are making a good case. Keep talking. You are making a good case for a combination.

Mr. HOLMES. No. I have not finished.

Mr. THOMAS. When you get through with the SATURN one you will say, "Well, we have to change this"——

Dr. DRYDEN. We will never be through with ADVANCED SATURNS.

Mr. HOLMES. It would be difficult to design this without overdesigning. The other factor is that if we try to locate the NOVA vertical assembly building southward we will have a very long haul by barge or rail.

Mr. THOMAS. We are not arguing with you. Put it on the moon or wherever you want to put it. We are talking about these complexes. Why can you not make one complex? Wouldn't you rather have one complex than two?

Mr. HOLMES. There must be two locations. They are 15 miles apart.

TIMING ON NOVA AND SATURN

Mr. THOMAS. In point of time it will be at least 18 months to 2 years behind the ADVANCED SATURN.

Mr. HOLMES. The present planning for the NOVA is about 1 year behind the ADVANCED SATURN as the backup for the lunar program.

Dr. SEAMANS. The ADVANCED SATURN will use a complex where the total vehicle, including the APOLLO capsule, will be mated and checked out inside of a building.

The reason we are doing this is because we can see that the frequency of firing really justifies this type of launching.

With the NOVA facility, on the other hand, it may very well not use this kind of assembly. We may actually assemble the NOVA vehicles on the launch pads as we have in the past with the SATURN C–1 and the other work we have done at the cape.

Mr. HOLMES. That is 10 to 15 miles away from this complex.

Dr. SEAMANS. They are two different kinds of launch complex at this time. We are not prepared at this time to lay out a facility that could possibly handle both kinds of launchings.

Dr. DRYDEN. Technically it is not any more feasible than to have a single complex for TITAN missiles and ATLAS missiles. They are different things. Their ground equipment is different. Connections in the blockhouses are all different. Everything about them is different. There is no such thing as a universal launch stand.

There is a MINUTEMAN launch stand, a POLARIS launch stand. You have the ATLAS, the TITAN. For each of these you have a peculiar and special design of launch stand and blockhouse equipment. You cannot put them together economically.

Mr. EVINS. Would it not be sensible to launch SATURN and then proceed with the NOVA program and keep it off a crash basis?

Dr. DRYDEN. I don't know it is crash, but this is a national decision which is certainly before the Congress at this session.

The President, in announcing this program, talked about full prosecution of both methods, one as a backup for the other on roughly the same time scale so one would be sure to work.

We have displaced the NOVA by a year. We would not feel too happy to put sole reliance on the rendezvous method of getting to the moon. It depends on how seriously you take the commitment to do this job in 10 years.

NEED FOR NEW TEST FACILITIES

Mr. EVINS. I have one question on the previous subject. Dr. Dryden, have you evaluated some of these simulated tests which can be adapted or changed? I am sure you gave consideration to all the Air Force facilities. Why is it always necessary to build a new facility when we have several testing facilities available already?

Dr. DRYDEN. It is a matter of technical capabilities. When you go to something which is much larger and complex you have to make your facilities grow proportionate to the size.

Mr. EVINS. Do you really propose to have the entire length and breadth tested?

Dr. DRYDEN. We cannot scale down a man. This is the principal problem. If you have a three-man capsule and you want to make control experiments with the men performing their functions you have to have essentially the capsule.

Certain things can be done with computing machines.

I know you gentlemen must get them confused because a simulator often is a set of boxes against a wall with a man sitting in a chair moving switches and watching meters. That is one type of simulation that is used. It is the simplest type. It is found valuable because it is so cheap to do.

Then you can move up to something where the man sits in a chair and watches a scaled-down version. The scaled-down version is tested in a piece of equipment.

To have realistic simulation of a man controlling the capsule you have to have the man and the capsule involved in the link, so there are all kinds of simulators and different degrees of complexity.

The one we are talking about is one in which the actual men can be used with actual controlled devices, and the only thing that is not there is a computing machine computing the response of the capsule.

Mr. EVINS. There is no available equipment which could be adapted or changed?

Dr. DRYDEN. Nothing of this size and capacity.

USE OF EXISTING FACILITIES

Mr. ULMER. We try to use existing facilities wherever possible. There are two items at the Atlantic Missile Range where we are doing just that. There is a project for modifications to provide a TITAN II pad, for example. There is another project in which pad No. 5 is proposed for modification.

Mr. THOMAS. While you are on that subject we built two spares down there for SATURN.

Dr. DRYDEN. Two spares?

Mr. THOMAS. Or was it one?

Dr. DRYDEN. There are two stands on one blockhouse.

Mr. THOMAS. $40 million. Why can't we use those for SATURN I?

Dr. DRYDEN. They are used for SATURN C–1. They will not take the SATURN C–5 which is a very much larger vehicle with much higher thrust.

Mr. THOMAS. What will we do with the spare?

Dr. DRYDEN. Fly SATURN C–1's. There the SATURN is assembled on the stand and ties the stand up for 3 or 4 months while you put it together.

Mr. THOMAS. What happened to the standby? Is that pretty well completed now?

Dr. DRYDEN. It is approaching completion.

Mr. THOMAS. How much did that cost? It was $40 million to $50 million; was it not?

Dr. DRYDEN. Something of that sort.

Mr. THOMAS. Not yet in use?

Dr. DRYDEN. It is approaching completion. We fired two SATURN's so far.

Mr. THOMAS. What utility will that have when it is completed?

Dr. DRYDEN. As I say, the SATURN has to be assembled on the pad and it takes about 4 months to do it. If you have one pad you can fire three a year. If you had two pads you start assembling the second one and you can fire twice as many, six a year.

Dr. SEAMANS. The stand will be used to launch the APOLLO and also for the scientific program.

Mr. EVINS. You say you cannot build a Cadillac on a Volkswagen assembly line.

Dr. DRYDEN. Not quite.

Mr. OSTERTAG. Dr. Dryden, I have two or three thoughts with regard to this entire picture. First of all, this deals with the Atlantic Missile Range but mainly Cape Canaveral?

Dr. DRYDEN. This is Cape Canaveral only.
Mr. OSTERTAG. It is under the Atlantic Missile Range title?
Dr. DRYDEN. That is right.

OVERALL COST OF CAPE CANAVERAL FACILITIES

Mr. OSTERTAG. We learned a few moments ago that the NOVA launch complex, rather than being $79.5 million, which is only 17 percent of the total, will be $457 million.

Have you any overall estimate of what this program is?

Dr. DRYDEN. About $1 billion in facilities at Canaveral as I recall it.

Mr. OSTERTAG. Over what period of time?

Dr. DRYDEN. The whole period.

Mr. HOLMES. If you wanted it another way, for these items, they are all fully funded except for the ADVANCED SATURN launch complex which we expect to run at a cost of $432 million, the NOVA complex at about $457 million, and the utility installations, the last item, will be around $48 million.

Mr. OSTERTAG. It will be interesting to learn how much over this $360 million this program will take to complete. You say they are fully funded except certain items.

Dr. DRYDEN. Total investment in facilities at Canaveral will approximate $1 billion. It works out a little less.

FULLY FUNDED PROJECTS

Mr. OSTERTAG. In the case of the military they usually require full funding.

Dr. DRYDEN. No, sir.

Mr. ULMER. Practically all the facilities are fully funded except in the few rare cases where the design of the facility parallels the design of the vehicle with which it will be used.

In those cases where we cannot make a reasonable cost for full funding we go incremental.

Mr. THOMAS. Let us get Mr. Ostertag's question answered clearly. This budget presents 14 items for the Atlantic Missile Range. All the items in this budget are fully funded except the NOVA complex which has a request for $79.5 million. Dr. Holmes thinks it will be somewhere in the neighborhood of $425 to $450 million.

The ADVANCED SATURN complex is funded, as I recall it, at 40 percent?

Mr. HOLMES. A total of $432 million. That is about 40 percent.

Mr. THOMAS. So this figure of $359 million-plus 3 to 5 years from now will be what?

Mr. HOLMES. A little over $1 billion.

Dr. DRYDEN. This is the original estimate. I have not checked it recently.

NOVA LAUNCH COMPLEX

Mr. OSTERTAG. Is the NOVA launch complex a construction proposition?

Dr. SEAMANS. This is all construction.

Mr. OSTERTAG. It is a construction proposition. How can you build this on a piecemeal and partly funded basis?

Dr. DRYDEN. The NOVA vehicle is about 50 feet in diameter and about 350 feet high. It is about 70 percent as high as the Washington Monument.

The thrust is about 12 million pounds. A large part of this construction is the foundation, just concrete. That can be started.

You are perfectly right that the blockhouse equipment cannot be started until you have the design of the vehicle completed, but in looking at this job of putting a man on the moon and looking at the time required, the longest leadtime item, what has to be started first is the launcher stand because it takes the longest to build. You have to start the launch stand while you are also designing the vehicle. You can clear the site, put in the utilities, pour the concrete for the foundation. You can also proceed somewhat further than this but you are perfectly right in saying that the final construction and the final elements of construction cannot be done until you have the vehicle designed.

Mr. OSTERTAG. Are they all separate contracts? Would $79.5 million be a given contract or part of the contracts?

Mr. HOLMES. More than one contract. If you turn to CF 2–M3 the drawings in dark print show fiscal 1963 construction and the light print shows our estimates of later construction. This is a quick overall view of how one would proceed to spend this money on a fiscal year basis.

You will see a footnote there concerning the darker print and the lighter print. The lighter print shows construction for future years. The dark ones can be started, such as subpad work for launch pad A and launch pad B, one vertical assembly and launch building, site preparatis and utility installations. Things that will not be started are such things as launch pad C and its associated complex, inspection and modification building, launch control building.

ADVANCED SATURN CONTRACTORS

Mr. THOMAS. First, who is your contractor on your ADVANCED SATURN and who is your contractor on the NOVA?

Mr. HOLMES. The construction contractors have not been selected, sir.

Dr. DRYDEN. The ADVANCED SATURN has. That is Boeing.

Mr. HOLMES. The vehicle contractors have been selected. Boeing is for the first stage of the ADVANCED SATURN, North American for the second stage, and Douglas for the third stage.

TIME SCHEDULE FOR CONSTRUCTION AND VEHICLE DEVELOPMENT

Mr. THOMAS. When will these be ready?

Mr. HOLMES. The first flight of ADVANCED SATURN is planned in 1965.

Mr. THOMAS. It is not going to take but 2 years to build this complex, is it?

Mr. HOLMES. It is going to take us more than that.

Mr. THOMAS. You mean it will take longer to build the complex than the vehicle?

Dr. DRYDEN. Yes.

Mr. THOMAS. That is not usually the case, is it?

Dr. SEAMANS. Long lead items are land procurement and building of large facilities. We carried out a study last summer jointly with DOD to review just that matter.

Mr. THOMAS. Has that been your general experience? On these big vehicles that have cost the time, the money, the energy, the brains; is that right?

Dr. SEAMANS. They are also long lead time items.

Mr. THOMAS. They are longer than construction, are they not?

Dr. DRYDEN. Dr. von Braun started the facilities on the SATURN C–1 at the same time as the vehicle or earlier.

Mr. HOLMES. These launch complexes are long lead items.

Mr. THOMAS. I thought von Braun had been working on this big advanced SATURN at least 3½ or 4 or 5 years.

Dr. DRYDEN. That is SATURN C–1, but the SATURN C–5——

Mr. HOLMES. The contract for the advanced SATURN was let last fall.

Mr THOMAS. How long to complete the C–5 compared to the C–1?

Mr. HOLMES. The first flight of the C–5 is planned in 1965.

Mr. THOMAS. Are you not ambitious in point of time?

Dr. SEAMANS. It is well underway. The conceptual work started last summer.

Dr. DRYDEN. The engine was started 3 or 4 years ago, the F–1 engine.

Mr. OSTERTAG. Where do you get the 37, 34, 39?

Mr. LILLY. Those are the numbers assigned to the complexes.

Mr. HOLMES. The pads at Cape Canaveral are numbered in sequence.

Dr. SEAMANS. They are assigned by AMR, not numbered consecutively along the beach.

A. & E. AND OVERHEAD EXPENSE

Mr. THOMAS. Is the Corps of Engineers doing this project for you?

Mr. HOLMES. Yes, sir.

Mr. THOMAS. What have you got charged against this for engineering?

Mr. LILLY. The engineering on these jobs is calculated for A. & E. work at approximately 6 percent; including the Corps' supervision, inspection and overhead; it comes to a total of between 10 and 12 percent.

Mr. THOMAS. How much of this $1 billion is for Corps of Engineers? Will it be $120 million?

Mr. LILLY. Somewhere in that range including the amounts to be paid the A. & E. contractors.

Dr. SEAMANS. Design engineering and the Corps.

Mr. LILLY. They will not be getting anything for the equipment that goes into the facilities.

Mr. THOMAS. On top of that figure that you pay the Corps of Engineers. The Corps of Engineers has to do some contracting and get some construction people and some more engineers. How much more is that going to be?

Mr. LILLY. This cost is all-inclusive.

Mr. THOMAS. Included in the 12 percent?

Mr. LILLY. Yes, sir.

Mr. THOMAS. What part of the 12 percent does the Corps get?

Mr. LILLY. The Corps itself receives on the average 5 to 7 percent for Corps supervision, inspection, and overhead, which includes the cost of their people.

Mr. THOMAS. You have four layers, you have the top agency itself, the staff of the agency, the Corps of Engineers, then the private contractor. Why can you not cut out one of those layers in your contracting organization? You do not need the Corps of Engineers and the private concern, too.

Dr. DRYDEN. I think, Mr. Thomas, this is no different from the construction that has been caried out at Canaveral. As a practical matter, it is not possible for us to use a different contracting system in building facilities at Canaveral than the one used by the Air Force. We have used the Corps of Engineers. The Corps of Engineers prepares specifications——

Mr. THOMAS. This is not Air Force money; this is NASA money. You are not bound by anything that the Air Force does.

Dr. DRYDEN. It is very difficult to bring in another contractor to work alongside of the Corps of Engineers effort at Canaveral.

Dr. SEAMANS. They are a highly qualified group. We would also have to expand our in-house capability. They can do certain things we cannot.

Mr. THOMAS. What?

LAND ACQUISITION BY CORPS OF ENGINEERS

Dr. DRYDEN. The first job they are doing is land acquisition. They have the setup to go into the title examination, dealing with people, condemnation suits, and all the rest of it. We have no facilities for negotiating that.

Mr. THOMAS. You can hire private attorneys to examine titles, represent the Corps of Engineers in the Federal courts.

Dr. DRYDEN. I forget the total number of pieces of property involved in the Canaveral transaction, but each one has to have somebody sitting in the office negotiating, the man either agrees to sell at an appraised price or says he will not take it.

Mr. THOMAS. There is a lot of detail work, yes.

Dr. DRYDEN. Somehow this has to be provided for.

Mr. THOMAS. You have two sets of engineers involved in each one of these projects that you do not do yourself. You have the Corps of Engineers——

Dr. DRYDEN. Who prepared the specifications and who will take the bids.

Mr. THOMAS. Then you have some private contractors that come around and do the work and do the engineering.

Dr. DRYDEN. And detailed design.

Mr. THOMAS. The private people will do it for 15 or 20 percent less in dollars, and in point of time they will do it another 20 percent less.

Mr. OSTERTAG. Right on that point may I ask this. Under this entire Atlantic Missile Range construction facility for 1963, I note a large majority are under existing area and the other is under the new area. Is that correct?

Mr. HOLMES. That is correct.

Dr. DRYDEN. It is a contiguous plot.

Mr. OSTERTAG. By existing area you mean existing property where there is no land acquisition involved?

Dr. DRYDEN. That is right.

Mr. THOMAS. Already owned by the Government.

Mr. OSTERTAG. There would be no acquisition problems involved there or costs in regard to it?

Dr. DRYDEN. That is right.

Mr. OSTERTAG. How about the new area? Is that all contingent on the other appropriation?

Dr. DRYDEN. Yes, sir.

Mr. OSTERTAG. Without that, these would not be in the making.

MODIFICATION TO SATURN LAUNCH COMPLEX NO. 34

Mr. THOMAS. Let us turn to the modifications to SATURN launch complex No. 34; $3,765,000. Put pages CF–2, A–3, A–4, and the table on A–7 in the record.

(The material referred to follows:)

MODIFICATIONS TO SATURN LAUNCH COMPLEX NO. 34, ATLANTIC MISSILE RANGE

DESCRIPTION

Additions and modifications are required to SATURN launch complex No. 34 to accommodate operational C–1 SATURN vehicle design configurations. The project includes additional liquid propellant blast protection; an extension of the service structure rail beams; modifications to air conditioning, ventilation, and vehicle environmental systems; extension of the high-pressure gas and transfer system facilities; alterations to the service structure; and modifications to the umbilical tower to incorporate an escape system, as follows:

(*a*) *Extension of the service structure rail beams.*—The service structure rail beams will be extended from 600 feet to 1,200 feet from the launch area to park the structure a safe distance from potential combined blast effects of hydrogen and other propellants in event of detonation with larger launch vehicles. The project will also include vibroflotation compaction to increase earth bearing values, and installation of concrete support beams.

(*b*) *Liquid propellant systems blast protection.*—The existing liquid oxygen storage sphere will be "hardened" by the installation of a structural tiedown ring on the sphere with steel cable ties extending from this ring to concrete deadmen. The protective emplacements for liquid oxygen transfer equipment will also be expanded. The existing liquid hydrogen emplacement will be increased to provide an installation with concrete footings for one additional storage sphere. Protection for the liquid hydrogen transfer pumps and related equipment will be provided by construction of an earth berm against a concrete revetment. Increased utility services with the necessary underground cables and ducts will also be provided at the liquid hydrogen storage and transfer facility.

(*c*) *Modifications to air-conditioning, ventilation, and vehicle environmental systems.*—Modifications to the systems will be required to accommodate the advanced C–1 vehicle configurations.

(*d*) *High-pressure gas systems and transfer facilities.*—The existing high-pressure gas systems and transfer facilities will be augmented and the scope and capacities of the existing transfer facilities will be increased.

(*e*) *Modifications to service structures.*—The service structure for vehicle handling and erection will be modified to accommodate various vehicle configurations. Modifications will provide new or relocated service platforms, clearance changes between vehicle and structure, guying, and wind protection.

(*f*) *Umbilical tower escape system.*—The structural members of the umbilical tower will be modified and redesigned to incorporate a mechanized escape system to enable the astronaut to leave the spacecraft after the service structure has been retracted from the space vehicle.

JUSTIFICATION

The basic SATURN launch complex No. 34 includes all necessary facilities for handling, storing, servicing, checking out, erecting, and launching early SATURN vehicles, as well as the required administrative and logistical facilities, and the special research laboratory facilities to support various projects included in the initial phase of the SATURN program. The objectives of the SATURN project were originally limited to developing and launching large clustered boosters with dummy upper stages to establish feasibility. Criteria for a minimum type facility were developed with minimum guidelines, and construction of the complex was initiated. As the program developed, the need for servicing live upper stages became a requirement, making it necessary to provide capability for upper-stage propellant loading, control, and servicing pneumatics, and additional control and monitoring facilities for upper stages. This work is proceeding with funds provided in the fiscal year 1962.

The need for larger vehicles and increased payload capabilities now requires a further modification of the basic complex. The fiscal year 1962 project did not take into account the then undeveloped criteria on the blast potential of liquid hydrogen fuels. A recent study produced new criteria which indicated that the fiscal year 1962 project provided inadequate funds to meet the requirement for safety represented in this project by extension of service structure rail beams and protection of the propellant system. The study also produced criteria which necessitates modification to the air-conditioning, ventilating, and environmental systems. Modifications to the high-pressure gas system are connected with the environmental systems modifications and with the employment of helium as a pressurization agent for upper stages. The modifications to the service structure will provide for hurricane protection to the vehicle and for explosive measures in critical areas of the service structure. The requirement for the umbilical tower escape system is dictated by safety considerations. With the advent of larger, higher thrust vehicle concepts, launch facilities and support systems must undergo continuous modification to provide the required additional capabilities.

Cost estimate

(*a*)	Land acquisition		
(*b*)	Site development and utility installations: Site preparation		$50,000
(*c*)	Facility construction and modifications		1,785,000
	Extension of service structure rail beams	$1,030,000	
	Modifications to service structure	480,000	
	Modifications to umbilical tower	275,000	
(*d*)	Equipment, instrumentation, and support systems		1,555,000
	Protection of propellant systems	$185,000	
	Modifications to ventilation, air-conditioning, and environmental systems	370,000	
	Modifications to high-pressure system	1,000,000	
(*e*)	Design and engineering services		375,000
	Total estimated cost		3,765,000

MODIFICATIONS TO SATURN LAUNCH COMPLEX NO. 37

Mr. THOMAS. We will put pages CF 2–B1 and CF 2–B3 in the record.

(The pages referred to follow:)

MODIFICATIONS TO SATURN LAUNCH COMPLEX NO. 37, ATLANTIC MISSILE RANGE

DESCRIPTION

Additions and modifications are required to the facilities within the dual pad Saturn launch complex No. 37. A drawing of this complex is shown on the next page. The project includes:

High pressure gas system.—Additional gas distribution lines are necessary to provide services to pad 37A. This system will be used for checkout, purge, and pressuization of the vehicle and for the functional operation of the ground support equipment.

Umbilical tower escape systems.—The umbilical towers on both launch pads will be modified and redesigned to incorporate mechanized escape (or rescue) systems to enable the astronaut to leave the spacecraft after the service structure has been retracted from the space vehicle on either pad.

Modifications to service structure.—The service structure for vehicle handling and erection will be modified to accommodate various vehicle configurations. The modifications will include changes to the structure to provide new service platforms, the addition of elevators, and clearance changes.

JUSTIFICATION

The improvements covered by this project are required for launching Advanced Saturn vehicle configurations. The objectives of the Saturn project were originally limited to developing and launching large clustered boosters with dummy upper stages to establish feasibility. Fiscal year 1962 funds provided dual pad capability for Saturn launch complex No. 37; all necessary facilities for handling, storing, servicing, checking out, erecting, and launching the early Saturn vehicles; the required administrative and logistic facilities; and special research laboratory facilities to support various projects included in the initial phase of the Saturn program. Criteria for a minimum type facility were developed with minimum guidelines, and construction of the complex was initiated. As the program developed, the need for servicing live upper stages became a requirement, making it necessary to provide capability for upper stage propellant loading, control and servicing pneumatics, and additional control and monitoring facilities for upper stages. With the advent of larger, higher thrust vehicle concepts, launch facilities and support equipment must undergo continuous modification and redesign to provide the required additional capabilities.

Cost estimate

A. Land acquisition	----------
B. Site development and utility installations	----------
C. Facility construction and modifications	$184,000
Modifications to service structure	184,000
D. Equipment, instrumentation, and support systems	828,000
High pressure gas system	276,000
Umbilical tower escape system, pad A	276,000
Umbilical tower escape system, pad B	276,000
E. Design and engineering services	138,000
Total estimated cost	1,150,000

MODIFICATIONS TO PROVIDE A LAUNCH COMPLEX FOR SOLID SUBORBITAL VEHICLES

Mr. THOMAS. We will put pages CF 2–C1, CF 2–C3, and CF 2–C4 in the record.

(The pages referred to follow:)

MODIFICATIONS TO PROVIDE A LAUNCH COMPLEX FOR SOLID SUBORBITAL VEHICLES, ATLANTIC MISSILE RANGE

DESCRIPTION

Modifications are required to the existing REDSTONE facilities at launch pad No. 5 to provide a launch facility for solid suborbital rocket boosters to be used in APOLLO development testing. The modifications will consist of removing the present REDSTONE holding mechanism and installing a new holding mechanism for the solid fueled booster; installing new instrumentation cabling from launch pad No. 5 to the existing blockhouse; modifying the existing service tower to install a new white room which will be required at the level of the capsule that will be on top of the booster (this white room is required to provide a dust free, humidity control area where capsule checkout and minor repair can be accomplished); modifying the present umbilical tower if possible, or fabricating a new one; constructing a revetment between the modified pad No. 5 and the existing blockhouse; and relocating a present road and parking area.

JUSTIFICATION

The existing pad No. 5 is used for the REDSTONE (maximum thrust of 78,000 pounds) program. To utilize to the maximum feasible extent existing facilities in this area, it is proposed to modify launch pad No. 5 to handle the greater thrust of a solid fueled booster (maximum thrust of 250,000 pounds using seven engines). This greater thrust requires that the holding mechanism for the REDSTONE be removed and a new holding mechanism be installed. The fuel to be used by the booster requires safety precautions and safety distances for the supporting facilities; this condition requires that a revetment be constructed to protect the existing blockhouse, and that a road and parking area be relocated.

The conduct of Project Apollo requires the flight qualification of spacecraft modules and systems prior to the first manned flight. Many of these items can be partially or completely qualified with suborbital flights with relatively inexpensive launch vehicles. The proposed boosters will be clusters of available solid fuel rocket engines (as many as seven) mounted in a fin stabilized airframe. These boosters will be used to qualify the following components:

(*a*) Command service module:
- Launch escape system.
- Earth landing system.
- Structural system (partial qualification).
- Service propulsion system (partial qualification).
- Stabilization.

(*b*) Lunar landing module (partial qualification):
- Structural system.
- Propulsion system.
- Stabilization system.

(*c*) Lunar landing propulsion module:
- Structural system.
- Propulsion systems.
- Stabilization systems.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$226,000
Site preparation	$30,000	
Roads and parking areas	55,000	
Utility connections	141,000	
Water	42,000	
Sewage	17,000	
Electrical	82,000	
C. Facility construction and modifications		852,000
Modifications to launch pad No. 5	$495,000	
Pad modifications and holding mechanism	465,000	
Umbilical tower	30,000	
Service structure modifications	350,000	
Extension and modification of boom	40,000	
Outriggers and tower	100,000	
Dust and humidity control	170,000	
Addition to work platform	40,000	
Blockhouse revetment	7,000	
D. Equipment, instrumentation, and support systems		429,000
Booster air conditioning system	$120,000	
Fire protection system	150,000	
Communication system	9,000	
Telemetering and command monitoring instrumentation	50,000	
Capsule and monitoring cable systems	100,000	
E. Design and engineering services		210,000
Total estimated cost		1,717,000

Mr. THOMAS. We will put in the record pages CF 2–D1, CF 2–D3, and CF 2–D4.

(The pages referred to follow:)

SUPPORTING FACILITIES—EXISTING AREA, ATLANTIC MISSILE RANGE

DESCRIPTION

This project requests funds for the construction of four support facilities in the NASA industrial area at the Atlantic Missile Range. Three engineering- and laboratory-type facilities and a consolidated supply and storage building, are required in support of all NASA programs. The scope of the project is as follows:

(*a*) *Launch operations facility.*—An air-conditioned five-story engineering and laboratory building 52 feet wide by 173 feet long will be constructed with a total gross area of 45,000 square feet. Building construction will be reinforced concrete with masonry walls. It will provide urgently required engineering and laboratory space for NASA scientific, technical, project engineering, and coordination personnel required to support NASA launch operations at the range.

(*b*) *Addition to engineering-operations buildings.*—A two-story addition of 15,300 square feet gross area will be constructed on the north end of the existing engineering-operations building to provide engineering office space for 140 technical personnel. The addition will be air conditioned and will conform with the architecture of the existing facility.

(*c*) *Central supply facility.*—This facility will be a partially air-conditioned central supply building approximately 136 feet wide by 250 feet long with a gross area of 33,600 square feet. The building will be constructed of prefabricated sections on concrete foundations and a concrete floor slab. It will permit NASA operations to consolidate their presently widely separated general supply activities and to provide a more efficient supply and storage function for such items as electronic equipment, and booster, upper-stage, and spacecraft spare parts and assemblies.

(*d*) *Engineering and laboratory annex.*—This facility will be an air-conditioned building of two-story construction, adjoining and connecting the existing engineering and laboratory building and the existing NASA supply building. The annex will be constructed of reinforced concrete frame with masonry curtain walls and glass block inserts in conformance with the existing architecture of the engineering and laboratory building. It will provide 13,760 square feet gross area. The annex will be used for the preparation, coordination, and reproduction of technical information, including documentation, publications, reports, technical exhibits, and presentations.

JUSTIFICATION

NASA's expanding activities at the Atlantic Missile Range require additional support facilities in the existing industrial area. The large influx of personnel, supplies, and materials in support of the program will require adequate space for the pursuit of this project.

Existing NASA facilities of the engineering, laboratory, supply, and storage, type, are occupied to the saturation point. There are no available facilities to accommodate any part of the planned increases in NASA or contractor personnel, or to handle the increased volume of supplies and materials that will be required to support NASA programs. Timely construction of these support facilities is an urgent requirement.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$457,000
Site preparation, grading, and filling	$171,000	
Roads and parking areas	73,000	
Utility connections	213,000	
C. Facility construction and modifications		1,877,000
Launch operations facility (45,000 square feet at $23 per square foot)	$1,035,000	
Addition to engineering operations building (15,300 square feet at $19 per square foot)	291,000	
Central supply facility (33,600 square feet at $9 per square foot)	303,000	
Engineering and laboratory annex (13,760 square feet at $18 per square foot)	248,000	
D. Equipment, instrumentation, and support systems		324,000
Equipment	202,000	
Furniture	122,000	
E. Design and engineering services		342,000
Total estimated cost		3,000,000

WORK PERFORMED BY CORPS OF ENGINEERS

Mr. THOMAS. These four projects are completely funded in these budget estimates?

Dr. DRYDEN. Yes.

Mr. THOMAS. Your engineering cost is about 12 percent. Half of that 12 percent goes to the Corps of Engineers. Doctor, are you sure you cannot get along with one engineering crew here rather than two?

Dr. DRYDEN. I do not think we can work at that location except through the Engineers as a practical matter. They have done all the construction in that area.

Mr. THOMAS. So what?

Dr. DRYDEN. Well, the one attempt we made to do a few things with Government people we ran into a strike situation immediately.

Mr. BOLAND. Are we better off with the Corps of Engineers doing this type of work?

Dr. DRYDEN. They have had experience.

Mr. HOLMES. They do very well.

Mr. OSTERTAG. How about the overall picture of NASA's construction? What percentage of your whole program are the Engineers involved in?

Mr. HOLMES. They are involved in the constructions at Canaveral, at Huntsville, Mississippi Test Facility, and Houston.

Dr. SEAMANS. We are using our own people on other work except at Seal Beach, Calif., where we are using the Bureau of Yards and Docks.

Mr. OSTERTAG. There is a definite reason for these particular places compared to the others.

Dr. DRYDEN. Yes.

Mr. THOMAS. Who do you use at Langley, Ames, Cleveland, and Edwards?

Dr. DRYDEN. Our own staffs handle the projects at these locations. In many instances of course we employ outside architects and engineers.

Mr. THOMAS. As I see it, the only reason you give is this is a military installation.

Dr. DRYDEN. And the fact that all construction on those sites has been under Engineers.

Mr. THOMAS. You have gone out and hired private brains in other cases.

Dr. DRYDEN. Let me make clear the point brought up here that the Engineers are really the group that have had the experience in building missile launch stands and test ranges. I do not know of any private group that has had any similar experience.

Mr. OSTERTAG. You have two systems, with the Army Engineers and without them. What is the difference?

Dr. DRYDEN. The difference is the type of work and the location of the work.

Mr. THOMAS. You do not mean to say the Corps of Engineers is the only one with brains to build one of these things, do you?

Dr. DRYDEN. I say they are the ones who have had the experience in building the launch stands.

Mr. THOMAS. They have had to go out and hire the brains to do it. They did not have it. All they have been is supervisors. They did not have the brains.

Dr. DRYDEN. They are the AE's.

Mr. THOMAS. That is right. There is a whole lot of difference. I give them a lot of credit.

Dr. DRYDEN. They have managed these enterprises.

Mr. THOMAS. They managed, but they did not have the technical know-how.

Dr. SEAMANS. There is a matter of the type and extent of the work.

Mr. THOMAS. The doctor is very frank, it is a military installation, and maybe it is best to let them go there.

Mr. OSTERTAG. As to efficiency and cost, is the comparison reasonably the same?

Dr. DRYDEN. Maybe this should be off the record.

(Discussion off the record.)

ADDITION TO ASSEMBLY FACILITY FOR UNMANNED SPACECRAFT

Mr. THOMAS. We will put pages CF 2–E1, CF 2–E3 in the record.

(The pages referred to follow:)

ADDITION TO ASSEMBLY FACILITY FOR UNMANNED SPACECRAFT, ATLANTIC MISSILE RANGE

DESCRIPTION

This project discusses the need for the construction of an air-conditioned addition to the first section of the spacecraft assembly building. The addition will consist of a second floor to the laboratory area and a new two-story engineering and laboratory building with an attached high-bay checkout and assembly area at the rear.

The engineering and laboratory portions of the addition (26,960 square feet) will be constructed of reinforced concrete with masonry curtain walls. The high bay area (18,225 square feet) will be of steel frame construction, with masonry and asbestos siding for the curtain walls. Two 15-ton bridge cranes, each having a hook height of 45 feet, will be provided in the high bay area for the handling of spacecraft.

JUSTIFICATION

Additional laboratory assembly and checkout facilities are required for the advanced and timely preparation, sterilization, evaluation, and performance of spacecraft and flight components under closely controlled environments of temperature, humidity, pressure, fungus, and spore-free ambients, and radiation to simulate expected actual flight conditions. Larger future spacecraft configurations will also be accommodated in this addition.

The existing spacecraft preparation facilities are inadequate in both scope and size to meet the 1964 calendar year flight schedules. The inadequacy of the existing spacecraft facilities is further emphasized by the concurrent requirements of the AGENA–B and CENTAUR-based flight programs, including Earth orbiter, lunar soft landing, and Venus and Mars flyby missions. Provision must be made for the simultaneous preparation of as many as four space vehicles with the additional possible requirement of providing backup vehicles. Longer preparation time schedules plus overlapping launching schedules for lunar and planetary mission, create the requirement for additional payload preparation and checkout facilities.

Cost estimate

(*a*) Land acquisition	
(*b*) Site development and utility installation	$174,800
Site preparation	55,200
Parking areas	18,400
Utility connections	101,200
(*c*) Facility construction and modifications	1,408,800
Building (45,185 square feet at $31.18 per square foot)	1,408,800
(*d*) Equipment, instrumentation, and support systems	183,700
Bridge cranes (2)	130,000
Furniture	25,000
Special equipment	28,700
(*e*) Design and engineering services	232,700
Total estimated cost	2,000,000

Mr. THOMAS. As to the addition to assembly facility for unmanned spacecraft, these are good, round figures. We always have an understanding with you, Doctor, that you are going to do this job for 10 percent less than the budget except this year when it is to be 12 percent; is that right?

Dr. DRYDEN. That 2 percent is unfair.

Mr. THOMAS. We have a big volume here this year. The bigger the volume the less it is going to cost.

EXPLOSIVE-SAFE ASSEMBLY FACILITIES FOR UNMANNED SPACECRAFT

Mr. THOMAS. We will put pages CF 2–F1, CF 2–F3 in the record. (The pages referred to follow:)

EXPLOSIVE-SAFE ASSEMBLY FACILITIES FOR UNMANNED SPACECRAFT, ATLANTIC MISSILE RANGE

DESCRIPTION

This project requests funds for the construction of explosive-safe facilities for the final assembly, dynamic and static balancing, and sterilization of unmaned spacecraft. The project includes:

(*a*) ***Final assembly and sterilization laboratory.***—A laboratory of approximately 2,400 square feet of gross floor area is required. The structure will be

of reinforced concrete and revetted as required to provide blast protection. The building will be dust-free, air-conditioned, and equipped with the necessary spacecraft handling equipment to prepare the spacecraft for flight.

(*b*) *Capsule laboratory.*—Approximately 1,200 square feet of air-conditioned and dust-free space is needed for the assembly, checkout, and dynamic balancing of the instrumentation capsule and the solid propellent retromotors. The building will be constructed of reinforced concrete and revetted as required to afford proper blast protection. The project also includes handling, checkout, dynamic test, and sterilization equipment.

(*c*) *Storable liquid propellent motor laboratory.*—This structure will provide approximately 600 square feet of space for the checkout, loading, and pressurizing of the storable spacecraft liquid propellent motors. The building will be of reinforced concrete design and revetted as required to afford blast protection. The area will be equipped with the necessary test and fueling equipment, and will provide for the protection of personnel against toxic propellants.

(*d*) *Instrumentation laboratory.*—This laboratory containing 1,600 square feet of space will provide the necessary facility to house electronic instrumentation racks, consoles, and engineering personnel. The building will be constructed of reinforced concrete or masonry and revetted to afford blast protection. It will be separated from the other laboratories to provide maximum protection of personnel during test phases, and to provide protection in case of an explosion. The building will be air-conditioned.

This project also includes the site preparation, utility connections, roads, and parking areas to provide a complete and operable facility.

JUSTIFICATION

The facilities that comprise this project are required to provide the laboratory space to handle and check out spacecraft utilizing solid and storable liquid propellent motors. With the advent of RANGER, MARINER, SURVEYOR, VOYAGER, and other large spacecraft programs, it is essential that additional explosive safe assembly facilities be provided. The existing facilities do not have the laboratory space or the height capability to meet the requirements for handling or checking out large spacecraft.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$150,000
Site preparation	$80,000	
Roads and parking areas	18,500	
Utility connections	51,500	
C. Facility construction and modifications		196,000
Building (5,800 square feet at $33.80 per square foot)	$196,000	
D. Equipment, instrumentation, and support systems		50,000
Bridge crane	$35,000	
Furniture	15,000	
E. Design and engineering services		54,000
Total estimated cost		450,000

APOLLO MISSION SUPPORT FACILITIES

Mr. THOMAS. On APOLLO mission support facilities, we will put in the record CF 2–G1, CF 2–G2, CF 2–G3, CF 2–G10, and CF 2–G11.

(The pages referred to follow:)

APOLLO MISSION SUPPORT FACILITIES, ATLANTIC MISSILE RANGE

DESCRIPTION

Several technical facilities are required for the preflight operational phase of the manned lunar program. The facilities will be located in the NASA industrial area at the Atlantic Missile Range. The project includes the following facilities:

(*a*) *Spacecraft operations and checkout facility.*—A facility is required for the modification, assembly, checkout, and preflight testing of manned spacecraft and their mechanical and electrical components and systems. A three-story masonry and steel air-conditioned engineering and laboratory building will be constructed. It will provide a high-bay assembly and test area and a low-bay fabrication and assembly area.

The high-bay area will be used for assembly and test and will adjoin all floors of the engineering and laboratory areas. It will contain two altitude chambers and two test pits. A crane hook height of 100 feet will be provided. The fabrication and assembly area will be located at the end of the high-bay area and will provide a total of 30,000 square feet of assembly area with crane hook heights of 35 feet.

Laboratories totaling approximately 30,000 square feet will provide facilities for testing mechanical, electrical, navigation, guidance, calibration, analysis, and environmental equipment. Data recording, processing, review, and quick-look analysis facilities will also be provided. A shop area of 4,400 square feet in the basement will provide shop service at a central point for the entire area. It will be suitable for the modification and refurbishing of spacecraft and will contain a machine shop, welding shop, sheet metal and plastics shop, electrical shop, and battery shop.

A biomedical facility of approximately 11,000 square feet is included for crew preflight operations peculiar to manned spacecraft functions, and beyond the normal hospital and medical support to be provided by the range. Technical facilities include simulation and training equipment, medical facilities, sleeping quarters, and food preparation and dining facilities. Also included will be necessary briefing, examination, and suiting areas.

The main building includes office space of 75,000 square feet to provide engineering and laboratory space for approximately 1,000 personnel. The building includes conference rooms, a library, an auditorium, and a cafeteria.

(*b*) *Reaction control systems facility.*—A one-story permanent-type internally blast-resistant laboratory-type building of 4,000 square feet gross area will be constructed for testing full-size space capsules. The facility will contain a test cell which will house reaction control system servicing equipment and the test equipment which is required in close proximity to the space vehicle. The facility will also include a control room, equipment storage room, personnel locker room, a special room for cleaning and storing parts removed from the spacecraft during process of testing, and external fuel handling and storage provisions.

(*c*) *Environmental test and service facility.*—The project includes a one-story permanent-type building of 4,000 square feet gross area to provide facilities for checking and testing components and environmental systems installed in space capsules. The building will contain a test cell and control room, and areas for component storage, test equipment storage, workshops, locker rooms, cleaning and storage of capsule parts, and storage of high-pressure gases.

(*d*) *Supply, shipping, and receiving facility.*—It is proposed to construct a one-story prefabricated partially air-conditioned building of 40,000 square feet gross area at a central location. The building will provide facilities for shipping, receiving, storing, and issuing materials and parts for spacecraft. It will also provide shop-type facilities for the maintenance of ground-support equipment and for modifications of this type of equipment to meet special requirements peculiar to each individual flight.

(*e*) *Pyrotechnic test, and weights and balance facility.*—An explosive safe assembly facility will be constructed in the form of a one-story blast-protected and revetted masonry building of 18,000 square feet gross area. The facility will be used for the buildup of pyrotechnic components and for determining the weight and the center of gravity of the spacecraft with assembled pyrotechnic items. The building height will allow the vertical positioning of the spacecraft.

(*f*) *Ordnance storage facility.*—A storage magazine is required for the safe storage of rocket motors and pyrotechnics. The facility will be used to store rocket motors for suborbital vehicles. The building will be constructed of reinforced concrete or concrete block, with a blowoff panel roof, and will be surrounded on all four sides by a blast-deflecting wall of earth. An overhead crane will provide for the movement of the large solid rocket motors.

JUSTIFICATION

The facilities proposed for construction in this project are required to conduct tests of crews, performance and operational concepts, reliability, and readiness. The nature of the program will require extensive training of the crews and evaluation of the spacecraft in a coordinated program. The facilities will be designed to accomplish a series of highly technical operations as discussed in detail on the project description. The proposed rate of launch, and the size, weight, configuration, and complexity of the proposed spacecraft and their associated payloads, have dictated the size of the facilities being requested. There are no facilities in existence which can be utilized for spacecraft of the weight and size now planned. The proposed facilities are essential to insure reliability of the many elements which make up the entire flight vehicle.

Cost estimate

(*a*) Land acquisition	
(*b*) Site development and utility installations	$4,010,000
Clearing	150,000
Excavation	100,000
Filling	1,250,000
Roads	370,000
Parking areas	80,000
Fencing	50,000
Domestic waterlines	146,500
Fire protection waterlines	123,500
Water storage	450,000
Sewage lines	225,000
Industrial powerlines	725,000
Critical powerlines	75,000
Steamlines	200,000
Communication lines	65,000
(*c*) Facility construction and modifications	10,645,000
Spacecraft operations and checkout facility (225,000 square feet at $38 per square foot)	8,550,000
Reaction control systems facility (4,000 square feet at $56 per square foot)	225,000
Environmental test and service facility (4,000 square feet at $56 per square foot)	225,000
Supply, shipping, and receiving facility (40,000 square feet at $12 per square foot)	480,000
Pyrotechnic test, and weights and balance facility (18,000 square feet at $56 per square foot)	1,008,000
Ordnance storage facility (5,100 square feet at $30 per square foot plus $4,000 for blast revetment)	157,000
(*d*) Equipment, instrumentation, and support systems	5,855,000
Spacecraft operations and checkout facility	4,685,000
Control system power supplies	150,000
Control system air conditioning	150,000
Heating and cooling system	500,000
Elevators	75,000
Cranes	175,000
Altitude power system	875,000
Vaccum pumps	330,000
Laboratory equipment	1,300,000
Shop equipment	330,000
Service platform	800,000
Reaction control systems facility	108,000
Laboratory equipment	100,000
Shop equipment	8,000

Cost estimate—Continued

(*d*) Equipment, instrumentation, and support systems—Continued	
Environmental test and service facility	$175,000
Laboratory equipment	100,000
Shop equipment	75,000
Supply, shipping, and receiving facility	167,000
Crane	100,000
Shop equipment	67,000
Pyrotechnic test, and weights and balance facility	595,000
Crane	125,000
Laboratory equipment	250,000
Shop equipment	20,000
Service platform	200,000
Ordnance storage facility	125,000
Crane	125,000
(*e*) Design and engineering services	2,000,000
Total estimated cost	22,510,000

BIOMEDICAL FACILITY

Mr. THOMAS. I notice you use the language, "a biomedical facility of approximately 11,000 square feet is included for crew preflight operation peculiar to manned spacecraft." I have a longhand note here, "I note we have several of these scattered around already."

Dr. SEAMANS. We have a limited facility already at the Cape for the MERCURY crew.

Mr. THOMAS. You are building a nice big one at Ames.

Dr. SEAMANS. These are for people about to fly the next day. This is a place where the John Glenns of the future can be checked prior to flight, fed the right food, and so forth.

Mr. THOMAS. What are you going to do with the place at Ames?

Dr. SEAMANS. The place at Ames, we were discussing earlier, the simulator is not for the preparation of——

Mr. THOMAS. Why do you have to have a biochemical laboratory?

Dr. SEAMANS. That is for fundamental research on small organisms, bacteria.

Mr. THOMAS. You do not need 11,000 square feet here, do you?

Mr. HOLMES. We have used the hangar that we talked about previously for Glenn—that is where he was quartered. It also contained simulation equipment. This project is to provide a facility for a much more extended operation.

Mr. THOMAS. Glenn did not use 11,000 square feet?

Mr. HOLMES. This project provides technical facilities including simulation training equipment, medical facilities, sleeping quarters, food preparation, dining facilities, all that.

Mr. THOMAS. Where did Brother Glenn sleep when you were fighting the elements and bad weather for 11 days?

Mr. HOLMES. Hangar S. We had a hangar fixed up for him there.

Mr. BOLAND. Why cannot that continue to be used?

Mr. HOLMES. It really is not large enough.

MODIFICATIONS TO TITAN II LAUNCH COMPLEX

Mr. THOMAS. Modifications to TITAN II launch complex, $2.4 million: We will put pages CF 2–H1, –4, and –5 in the record.

(The pages referred to follow:)

MODIFICATIONS TO TITAN II LAUNCH COMPLEX, ATLANTIC MISSILE RANGE

DESCRIPTION

This project covers the conversion of an existing TITAN I launch complex to a TITAN II launch complex. The complex will be used in the launching of TITAN II vehicles with GEMINI spacecraft as payloads. The proposed modifications are discussed in greater detail as follows:

(*a*) An extension of the erector tower structure is required to accommodate the modified TITAN II launch vehicle which is longer than the TITAN I launch vehicle.

(*b*) Relocation and the addition of work platforms on the erector tower will be required because of the difference in lengths of the TITAN II and the TITAN I launch vehicles. Work platforms will have to be added to provide access to the GEMINI spacecraft.

(*c*) A higher capacity jib hoist will be required to facilitate the hoisting of the GEMINI spacecraft into launch position.

(*d*) A "white room" work area will be required at the level of the spacecraft. This work area is required to provide a dust free, humidity controlled area where spacecraft checkout and minor repairs can be accomplished.

(*e*) The capacity of the hydraulic actuator system which raises and lowers the erector tower must be increased to accommodate the greater weight and resulting moment of the modified erector tower.

(*f*) An additional unbilical boom will have to be added to the existing umbilical tower. This boom is required to support the GEMINI spacecraft umbilical cable.

(*g*) The propellant handling and storage systems will require extensive modification and replacement due to the change from cryogenic propellants in the TITAN I to hypergolic propellants in the TITAN II. This work will include rework of the flume and skimming basin systems.

(*h*) Provision for the increased bulk storage of propellants will be required as a result of the increased usage of nitrogen tetroxide and arozene.

JUSTIFICATION

Project MERCURY, the initial step in the long-range national program of space exploration, is nearing completion. Project GEMINI has been approved as the follow-on project to provide a continuous source of development information. The primary purpose of Project GEMINI is to gain experience in long duration and rendezvous missions for use in future projects to extend man's capability in exploring space. Maximum use is being made of vehicle and equipment development which has already been accomplished for previous programs. The TITAN II has been selected as the launch vehicle on the basis of its status of development and on its capability of putting the Project GEMINI spacecraft into the desired orbit.

At the present time there are no launch complexes available which are capable of accepting the TITAN II GEMINI spacecraft combination. TITAN I launch complexes are available at the Atlantic Missile Range, however, which can be modified to meet the basic launch requirements of the present project. It is estimated that the planning and design of the necessary modifications to a TITAN I launch complex will require approximately 3 to 4 months. Approximately 12 months will then be required to procure new equipment, including several long-leadtime items, to install this equipment, and to modify the existing structural components of the complex. Upon completion of the modifications, checks of individual components and of the entire complex must be made prior to operational use in order to insure satisfactory and safe performance of all equipment. These checks will require approximately 4 months after completion of the construction phase.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installations		----------
C. Facilities construction and modifications		$2,187,000
Extension of the erector tower structure	$500,000	
Relocation and addition of work platforms	350,000	
High capacity jib hoist	5,000	
White room work area	245,000	
Increased capacity for hydraulic actuator	450,000	
Umbilical boom	141,000	
Modification and replacement of propellant handling and storage facilities	296,000	
Increased capacity for bulk storage of propellants	200,000	
D. Equipment, instrumentation, and support systems		----------
E. Design and enginering services		213,000
Total estimated cost		2,400,000

UTILITY INSTALLATIONS, EXISTING AREA

Mr. THOMAS. Utility installations in existing area, $800,000. We will put pages CF 2–I1 and 3 in the record.

(The pages referred to follow:)

UTILITY INSTALLATIONS—EXISTING AREA, ATLANTIC MISSILE RANGE

DESCRIPTION

This project provides for the construction and modifications required to extend the primary utility and road systems to service the new NASA facilities that are to be constructed in the existing industrial area at the Atlantic Missile Range in the fiscal year 1963 program. The scope of the work includes:

(*a*) *Communications.*—The underground duct systems and telephone cabling will be extended from existing facilities into the expanded industrial area. Construction will consist of approximately 5,000 linear feet of concrete encased underground ducts with the necessary manholes.

(*b*) *Electrical distribution.*—A new double-circuit 13.2-kilovolt feeder circuit will be installed from the new 69-kilovolt substation to the new NASA facilities in the industrial area. Construction will consist of approximately 6 miles of double-circuit pole line and approximately 5,000 feet of underground cabling in concrete encased ducts. Two 13.2-kilovolt circuit breakers will be provided at the 69-kilovolt primary substation.

(*c*) *Water.*—The existing potable water system will be extended to the new facilities. Construction will consist of approximately 2,200 linear feet of water mains.

(*d*) *Steam.*—Steam mains will be installed from the existing steamplants to the new facilities. The boiler capacity will be increased by a small addition to the existing plant. The structure will be a concrete block building (20 by 20 feet) with reinforced concrete foundation and floor slab. The roof will be of the buildup type on roof panels and bar joists.

(*e*) *Sewage.*—The project includes approximately 2,200 linear feet of sewage line extensions and an addition to the sewage plant.

(*f*) *Roads.*—Approximately 3,000 linear feet of 22 feet wide secondary access roads will be added to serve the new facilities proposed for the industrial area.

JUSTIFICATION

The proposed modifications and expansions to the existing utility systems are required to support the new facilities to be constructed in the industrial area. The capabilities of the present systems are limited; in some instances the systems are operating beyond their designed capacity. The systems must be extended to meet the planned facilities growth.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$700,000
Extension of underground ducts and telephone cabling	$93,000	
Extension of electrical lines and substation installation	258,000	
Extension of water mains	43,000	
Extension of steam mains including addition to existing plant	189,000	
Extension of sewer mains including addition to sewage plant	39,000	
Extension of roads	78,000	
C. Facility construction and modifications		
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		100,000
Total estimated cost		800,000

ADVANCED SATURN LAUNCH COMPLEX NO. 39

Mr. THOMAS. ADVANCED SATURN launch complex No. 39; $176,550,000. We are getting into the new area construction which we discussed earlier. Put pages CF2–J1, 2, 3, an 8 in the record.

(The pages referred to follow:)

ADVANCED SATURN LAUNCH COMPLEX NO. 39, ATLANTIC MISSILE RANGE

DESCRIPTION

Initial funding is requested for the construction of facilities for the ADVANCED SATURN launch complex No. 39. The scope of work in this project, covering approximately 40 percent of the cost of the total complex, includes the design and construction of a vertical assembly and checkout building; one launch pad with the associated propellant system; the rail transfer system from the vertical assembly building to the one launch pad; the launcher-transporters; and site preparation, roads, and utility connections. It also includes the procurement of checkout and control equipment, deflectors, firing accessories, instrumentation, and ground support equipment; and the design of the ordnance arming tower.

The facilities for the complex are based on the concept of transporting the ADVANCED SATURN vehicle from the assembly area to the launch pad by a rail transfer system. The concept as described herein is presently under intensive engineering review and analysis, the results of which could cause changes in any or all of the specific items being proposed for construction in this writeup. The total complex will consist of three major operating areas as follows:

(*a*) *Assembly and checkout area.*—The vertical assembly building will contain the necessary assembly and checkout facilities, along with supporting shops and engineering areas. The high-bay area will be approximately 665 feet long by 454 feet wide and the low-bay area approixmately 560 feet long and 370 feet wide. The upper stage bays will be 175 feet high and the assembly bays 460 feet high, with a maximum hook height of 400 feet. Each assembly unit (first, second, and third stage and spacecraft areas) will accommodate six vehicle stages for preliminary checkout, test, and maintenance. Final assembly and checkout will be accomplished on the launcher-transporter in the high-bay area. A launch control area will be located in the high-bay area to serve the dual purpose of checkout and launch. The concept will prevent undue duplication of lauch, checkout, computer, and control equipment. Required laboratory and shop space will be provided in the facility. The interlocking bridge crane system in the building will transfer stages to the assembly area.

Terminal facilities, which are not included in this budget due to their shorter leadtime, will be requested in a subsequent budget. They consist of a barge basin, intercoastal waterway connection, and storage facilities. The stages will be transported to this area by barge.

(*b*) *The intermediate (arming) area.*—Facilities for this area are not included in this budget due to their shorter leadtime, and will be requested in a subsequent budget. The intermediate area will contain facilities for arming retrorockets and squibs, facilities for the storage of ordnance supplies, and high pressure gas converter equipment.

(*c*) *Launch area.*—The launch area will contain facilities and equipment required to monitor final checkout, to load propellants, and to launch the vehicle. The fiscal year 1963 budget includes funds for the construction of only one launch pad with its associated propellant and storage facilities. The support building and ground control station which are also required for the launch pad are not included at this time due to their shorter leadtime.

The total facilities eventually to be constructed in this area are as follows:

Three identical launch pads, elevated 30 feet above grade, will be connected to the vertical assembly building by the rail system over which the launcher-transporter can operate. This system will pass through the intermediate area where the vehicle will be armed. Each pad will contain separate propellant storage and transfer facilities for liquid oxygen, liquid hydrogen, RP–1 fuel, and a support building. An automatic ground control station will be adjacent to the pad and contain distribution systems, checkout consoles, motors, recording and metering equipment, and the space vehicle environmental control system necessary for the final checkout, propellant loading, and launching of the vehicle. Prior to the propellant loading, the control of prelaunch operation will be transferred to the launch control center in the vertical assembly building where final preparations and launch will be effected through digital computer links.

The two launcher-transporters will be truss-type structures mounted on rails, and will include self-contained drive systems. Launch support and holddown arms will support and restrain the vehicle, and will serve as mounts for firing accessories and other equipment. Included with the launcher-transporters will be such firing accessories as cable masts, propellant-loading masts, water-quenching masts, and other electrical and pneumatic components. An umbilical tower approximately 360 feet high will also be mounted on each launcher-transporter. The tower will contain an elevator, cables for lights and communications, a pneumatic distribution system, a sprinkler system, camera and service platforms, and the umbilical connections.

JUSTIFICATION

The launch complex requested in this project will provide the necessary capability for launching the ADVANCED SATURN vehicle. Existing facilities cannot be modified for this purpose. To meet the scheduled flight test program and firing rate of the ADVANCED SATURN vehicle, it is necessary to request funds in the fiscal year 1963 for only a portion of the total facilities required for complete construction of the complex. Such items as the vertical assembly building, the rail transfer systems, and the launcher-transporters have long leadtimes and must be started in promptly to meet the operational ready dates. The launch frequency as presently scheduled requires only one pad in the program and funding of the additional proposed two pads will follow in a subsequent year's budget. Support items such as pads support buildings, and ground control stations have shorter leadtimes and can also be requested in a subsequent year's budget.

The total facilities of the complex are required for the rendezvous mission of placing a man on the moon in this decade. To meet this objective, three vehicles are needed for each mission; this requires three launch pad complexes for preflight testing and launch. Two vehicles would be on launch pads for flight testing and one vehicle would be on a launch pad as a backup for a possible abort in the rendezvous mission; thus all three launch pads would be utilized simultaneously. Each launch pad will have its own fuel and support facilities as the distances between the launch stands make the construction cost of central facilities prohibitive.

The need for the reduction of on-pad vehicle time to an absolute minimum requires the utmost utilization of these pads. To accomplish this purpose, it is proposed that the complete checkout and assembly of the vehicles will be undertaken in the vertical assembly building.

It is estimated that the funding requested in this project will permit the design, construction, and equipment of approximately 40 percent of the total facilities that comprise the three-pad launch complex.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$4,050,000
Site preparation and roads	$1,850,000	
Utility installations and connections	2,200,000	
C. Facility construction and modification		106,870,000
Vertical assembly and checkout building	$92,882,000	
Low bay area (370 by 560 ft.; 207,200 sq. ft. at $135 per sq. ft.)	27,972,000	
High bay area (454 by 665 ft.; 301,910 sq. ft. at $215 per sq. ft.)	64,910,000	
Rail transfer system	8,400,000	
Launch pad	5,588,000	
D. Equipment, instrumentation, and support systems		48,875,000
Propellant services	$23,600,000	
High pressure system	7,000,000	
Liquid oxygen system	9,000,000	
Fuel system	1,600,000	
Liquid hydrogen system	6,000,000	
Launcher-transporters (2)	11,100,000	
Checkout and control equipment	5,400,000	
Deflectors	775,000	
Firing accessories	5,000,000	
Instrumentation	2,000,000	
General support equipment	1,000,000	
E. Design and engineering services		16,755,000
Additional design funds in the amount of $3,700,000 are proposed to be allocated from fiscal year 1962 funds.		
Total estimated cost		$176,550,000

ADVANCED SATURN-NOVA SUPPORTING FACILITIES

Mr. THOMAS. Advanced SATURN-NOVA supporting facilities, $39,121,000. Put pages CF–2–K1, K2, K3, K13, K14, and K15 in the record.

(The pages referred to follow:)

ADVANCED SATURN-NOVA SUPPORTING FACILITIES, ATLANTIC MISSILE RANGE

DESCRIPTION

This project describes the supporting facilities that are required in the new area of the Atlantic Missile Range to support the manned lunar landing program. Current siting is tentative and, pending additional study and program development, is subject to change. The scope of work includes:

Mission support facilities

Facilities are required to provide space for approximately 1,000 NASA and contractor employees. Two buildings are proposed for construction, as follows:

(*a*) *Contractors' building.*—This building will provide a gross area of 60,000 square feet within a two-story building, for office, laboratory, and administrative management facilities for contractor personnel.

(*b*) *Engineering, laboratory, and operations building.*—A permanent-type, air-conditioned, two-story building will be constructed to contain approximately 65,000 square feet of laboratory and engineering space.

Range support facilities

The project includes funding for the initial increment of range instrumentation facilities and equipment. As the program develops, additional facilities and equipment will be required. It is anticipated that approximately $14 million will be required in the fiscal year 1964 program for these purposes. The facilities for this purpose in the 1963 program are described below; the 1963 equipment requirements are listed under "Cost estimate" and discussed under "Justification."

(*a*) *Cable storage and maintenance facility.*—This facility will be a permanent single story warehouse type masonry structure, with a total floor area of 30,000 square feet.

(*b*) *Central telemetry facility.*—This facility will consist of a permanent single-story, air-conditioned building of approximately 25,000 square feet in the new area. It will include the construction of a backup power station and the necessary antenna foundations.

(*c*) *Communications facilities.*—The construction of the following permanent-type, air-conditioned structures is proposed:

(1) A 7,500-square-foot addition to the central telephone office in the existing area.

(2) A 1,500-square-foot addition to the central telephone office at Patrick Air Force Base.

(3) A 15,000-square-foot central telephone office in the new area.

(4) Three repeater buildings with an average of 1,500 square feet each, at various locations in the new area.

(5) A 6,500-square-foot cable terminal building in the new area.

(*d*) *Nuclear radiation facility.*—This system will consist of multiple scintillation centers installed in blast-proof shelters in the vicinity of the launch pad, with radioactive sources mounted on the missile. Particle density will be recorded as detected by each counter during the lift-off phase. Post flight reduction of the counter recorded data will provide position information from lift-off to approximately 500 feet altitude. Real-time position, velocity, and acceleration will also be available for presentation.

(*e*) *Central control facility.*—A 14,500-square-foot addition is required to the existing central control building in the existing area. Construction will be permanent type and of special design to match the existing building. Interior modifications to the existing building and additional air conditioning are included.

(*f*) *Precision infrared tracking system facilities.*—Two concrete trailer pads with the necessary utilities will be located near the ADVANCED SATURN launch sites for the operation of precision infrared tracking trailers.

(*g*) *Surface surveillance radar facilities.*—Two mobile surveillance radar sites will be constructed. Each mobile site will include a van pad and the necessary utilities.

JUSTIFICATION

The manned lunar landing program will require the construction of several supporting facilities to house personnel, equipment, and instrumentation. The instrumentation in the existing area at the Atlantic Missile Range is not fully capable of supporting launches north of the boundaries of the existing area. The project accordingly includes a substantial increase in range-support instrumentation and equipment. More detailed justifications follow:

Mission-support facilities

(*a*) *Contractors' building.*—The size of the planned program requires close coordination between operational contractor personnel who are engaged in work on SATURN and NOVA upper stages and personnel who are engaged in booster work. This facility will provide the proximity necessary for this coordination and the required space to house contractor personnel.

(*b*) *Engineering, laboratory, and operations building.*—This facility will provide laboratory and engineering space to be used by systems engineering and technical personnel engaged in the test, evaluation, and checkout of parts, components, subassemblies, equipment, and materials for booster and upper stages. It will also house project engineers, project coordinating staffs, contract coordinating personnel, supporting personnel, and the equipment related to these functions.

Range-support facilities

(*a*) *Cable storage and maintenance facility.*—A secondary center is required for the communications and data-distribution cable maintenance and installation operations. The structure will provide limited interior storage for small cable and associated components and equipment. Large open-storage areas will be provided for the outside storage of cable reels. The cable maintenance and installations personnel operating from this facility will maintain all outside cable systems in the new area.

(*b*) *Central telemetry facility.*—The existing telemetry facilities at the Atlantic Missile Range must be supplemented by the construction of a central telemetry facility. The facility will support programs in both the new and existing areas. It will provide the necessary telemetry prelaunch checkout and coverage of vehicles during the initial portion of flight. It will also receive, process, record, or transmit data received from telemetry receiving stations at outlying sites (New Smyrna Beach, Fla., Vero Beach, and Grand Bahama Island). All acquired information will be correlated in this central facility and will be transmitted to user organizations for presentation in real time at their control centers.

(*c*) *Communications facilities.*—Several facilities, as outlined in the project description, are necessary to establish a communication and data-distribution network to support the manned lunar landing program.

(*d*) *Nuclear radiation facilities.*—These facilities are necessary to provide precision data, unhampered by weather, flame, or blast during the early lift-off phase. There are no systems presently in use which will provide real-time data of adequate accuracy during this critical phase. Such a system would add negligible weight and volume to the missile and would not be dependent on missile power. Remote recording of the metric data would preserve such data for analysis following any missile malfunction during lift-off.

(*e*) *Central control facility.*—The central control building in the existing area is the control point for a variety of vital functions, including range safety and range readiness. Launches are not permitted unless instrumentation along the flight path is ready for the test and populated areas can be protected against damage. These functions must be expanded to receive data from the new area instrumentation.

(*f*) *Precision infrared tracking system facilities.*—Facilities are required to place in operation a precision infrared tracking system that will support ADVANCED SATURN launches. Instrumentation will be provided to fulfill the requirement for an early launch tracking system capable of providing real-time data to the appropriate control centers. A mobile system using van pads with supporting utilities is contemplated.

(*g*) *Surface surveillance radar facilities.*—The facilities outlined in (*f*) above will provide the support required for a mobile surface surveillance radar. The radar will be used for range safety support of ADVANCED SATURN launches with the mobile unit positioned at one of the van sites to provide optimum surface surveillance coverage. A fixed position radar is planned for a subsequent budget to further implement this system.

(*h*) *Equipment, instrumentation, and supporting systems.*—The instrumentation itemized in the cost estimate is required due to the limited capability of the existing range instrumentation to handle launches in the new area north of the existing Cape Canaveral Missile Test Annex pads, and to handle extended missions. The development of new systems such as the precision infrared tracking system and the nuclear radiation ranging system is necessary to meet program requirements and reliability. Large quantities of additional equipment and support systems are required to supplement instrumentation presently available at Atlantic Missile Range and at remote locations. Among these requirements are provisions for the extension of existent telemetry coverage and data distribution both at lift-off and during first phase of flight; extended camera coverage of all types; highly accurate optical, infrared, and various special precision and high resolution tracking systems for trajectory position and velocity surveillance systems; extended central control capabilities; coordination systems with global range network; redundant command control and extended range safety coverage; intercommunications systems; and radiation ranging systems. The instrumentation proposed for funding in this project is required for the initial launch phase.

Cost estimate

(*a*) Land acquisition		
(*b*) Site development and utility installations		$1,574,000
Site preparation	$560,000	
Roads and parking areas	404,000	
Utility connections	610,000	
(*c*) Facility construction and modifications		6,986,000
Mission support facilities:		
Contractors' building (60,000 square feet, at $22 per square foot)	$1,320,000	
Engineering, laboratory, and operations building (65,000 square feet, at $23 per square foot)	1,500,000	
Range-support facilities:		
Cable storage and maintenance facility (30,000 square feet, at $15 per square foot)	450,000	
Central telemetry facility (25,000 square feet, at $50 per square foot)	1,250,000	
Nuclear radiation facilities	250,000	
Central control building addition (14,500 square feet, at $38.62 per square foot)	560,000	
Precision infrared facility	30,000	
Surface surveillance radar facility	40,000	
Communications facilities (35,000 square feet, at $45.50 per square foot)	1,586,000	
Central telephone office, new area (15,000 square feet).		
Central telephone office addition, existing area (7,500 square feet).		
Cable terminal building, new area (6,500 square feet).		
Repeater building, new area (4,500 square feet).		
Central telephone office addition, Patrick Air Force Base (1,500 square feet).		
(*d*) Equipment, instrumentation, and support systems		28,661,000
Central telemetry equipment	$6,248,000	
Telemetry control data terminal equipment	1,445,000	
Inside and outside cable system (1,200 miles)	10,597,000	
Intercommunication equipment	336,000	
Precision early launch rate equipment	4,929,000	
Nuclear radiation ranging system	724,000	
Central control equipment	2,120,000	
Precision infrared triangulation system	1,591,000	
Universal timing terminal unit	44,000	
Data handling equipment for range rate station	243,000	
Surface surveillance radar	144,000	
Office equipment and furniture	240,000	
(*e*) Design and engineering services		1,900,000
Total estimated cost		39,121,000

APOLLO STATIC TEST FACILITY

Mr. THOMAS. APOLLO static test facility: $5 million. Put pages CF 2–L 1 and 3 in the record.

(The pages referred to follow:)

APOLLO STATIC TEST FACILITY, ATLANTIC MISSILE RANGE

DESCRIPTION

This project involves the construction of two test stands and related structures, and the installation of the necessary equipment, instrumentation, and support systems. A steam ejector will be provided to simulate the space vacuum environment in which the spacecraft rocket engines must be able to ignite. The facility will be located east of launch pad No. 5 so that use may be made of the existing blockhouse of launch complex Nos. 5 and 6. Studies have indicated that this location is the most practicable and economical.

JUSTIFICATION

Two stands are required for static tests of the APOLLO spacecraft. One test stand will be used for static firing and proof testing cryogenic lunar hypergolic engines of the APOLLO service module. Both of the modules will be tested simultaneously. Static testing on the earth of the lunar landing and takeoff stages of APOLLO spacecraft under simulated lunar conditions is a vital part of the overall systems testing programs. The safety of the astronauts and the fulfillment of the assigned missions cannot be predicated until confidence factors have been developed by these tests. There are no existing facilities available to perform this type of testing.

Cost estimate

A. Land acquisition	
B. Site development and utility installations	$354,000
Site preparation	13,000
Roads and parking areas	64,000
Utility connections	90,000
Railroad switches	57,000
Railroad track	130,000
C. Facility construction and modifications	445,000
Lunar module test stand	230,000
Service module test stand	130,000
Pumphouse facility	35,000
Boiler facilities	50,000
D. Equipment, instrumentation, and support systems	3,605,000
Lunar module stand fire protection system	150,000
Lunar module stand electrical system	920,000
Service module stand fire protection system	150,000
Service module stand electrical system	641,000
Vacuum system	136,000
Propellant system	513,000
Instrumentation	845,000
Cabling	250,000
E. Design and engineering services	596,000
Total estimated cost	5,000,000

NOVA LAUNCH COMPLEX

Mr. THOMAS. NOVA launch complex; $79.5 million. We discussed this item earlier and Mr. Holmes allows that this estimate provides for 17 percent of the total cost of the complex instead of 35 percent as is shown here. Insert pages CF 2–M 1 and 2 in the record and correct that percentage.

(The pages referred to follow:)

NOVA LAUNCH COMPLEX, ATLANTIC MISSILE RANGE

DESCRIPTION

This project requests the funds necessary to initiate the design and construction of a complex for the assembly, checkout, and launch of very heavy vehicles of the NOVA class. The fiscal year 1963 portion of the project includes the construction of one vertical assembly and launch building, the subpad work for two launch pads, and the site preparation and utilities installations. The latter would include such items as canals, roads, and water and power services in the complex area. The design of long leadtime items, such as the launcher transporter, propellant systems, and control and checkout systems, is also included in this project. It is estimated that the fiscal year 1963 request covers approximately 17 percent of the total cost of the complex. The complex will be divided into two general areas, as follows:

(*a*) *Launch control area.*—This area will include the launch control center, high pressure gas conversion facilities, and upper stage inspection and modification facilities. Space will also be provided for the receipt and temporary storage of spacecraft. The supporting facilities such as roads, causeways, bridges, and utilities within the area are also included.

(*b*) *Vertical assembly and launch area.*—Three launch pads will be constructed, each containing a vertical assembly and launch building, and propellant storage and transfer facilities. The vehicle will be assembled, checked out, and launched from the vertical assembly and launch structure which will be of fixed design. The structure as presently envisioned will be approximately 470 feet high and 300 feet long and will be designed to withstand launch pressures as well as hurricane loadings. Remote-controlled vertical louvers and a split opening roof are contemplated to allow full opening and pressure relief during launch.

The transporter for the first stage will serve as a launcher and will be integral with the booster from initial assembly to launch. The transporter-launcher unit will move through a system of canals to the vertical assembly and launch building. After the transporter is positioned, the locks will close and the water will be pumped out. The transporter will then be firmly founded and used as a launch platform. Following launch, the water will be pumped back into the lock and the transporter floated away for reconditioning and the acceptance of another first stage booster. The launcher-transporter concept is unique and special design and construction techniques will be required.

The remaining stages for the completed NOVA vehicle will be brought to the launch area by water or road and will be assembled in the vertical assembly and launch building. The assembled vehicle will be checked out and control transferred ot the control center for launch. The checkout and launch systems will be linked through computers.

JUSTIFICATION

The NOVA vehicle is being designed for a thrust of 12 million pounds. The vehicle will be used for launching very heavy payloads to direct landing on the moon without the need for rendezvous. The three pad complex described above will launch eight NOVA-type vehicles per year. Each launch pad will have the capability to permit assembly, preflight checkout, launch, and pad refurbishing for only four vehicles per year. This requires two launch pads to meet the scheduled eight launches per year. However, one additional pad is required for backup in the event of an explosition or when major delays in launching from the other pads occur.

82964—62—pt. 3——48

Cost estimate

(*a*) Land acquisition		
(*b*) Site development and utility installations		$5,770,000
Site preparation, grading, and filling	$2,100,000	
New roads	1,700,000	
Electric lines	1,000,000	
Water lines, potable and industrial	970,000	
(*c*) Facility construction and modifications: Vertical assembly building (141,000 square feet at $430 per square foot)		60,630,000
(*d*) Equipment, instrumentation, and support systems		
(*e*) Design and engineering services		13,100,000
Total estimated cost		79,500,000

UTILITY INSTALLATIONS—NEW AREA

Mr. THOMAS. Utility installations in the new area are $22 million. Insert pages CF–2, N–1–3 and N–9–10 in the record.

(The pages referred to follow:)

UTILITY INSTALLATIONS—NEW AREA, ATLANTIC MISSILE RANGE

DESCRIPTION

This project covers the extension of range utilities and the construction of range support facilities in the new area of the Atlantic Missile Range in support of the manned lunar landing program. The scope of work includes:

(*a*) *Canal dredging.*—The dredging of approximately 18 miles of 100-foot-wide canal to a depth of 12 feet will be required to service launching sites.

(*b*) *Primary and access roads and bridges.*—This item consists of access and interior roads and bridges as follows:

Exterior of the site: Approximately 5 miles of existing Route AIA from Haulover Canal Bridge north to the Volusia County line will be reconstructed and widened. A new two-lane bridge will be built over the Haulover Canal. The road will be 24 feet wide with 6-foot-wide shoulders on either side.

It is proposed to rebuild 1.3 miles of Route A1A south of gate 2 (sought boundary) to provide a 24-foot-wide roadway with 6-foot-wide shoulders on either side. A new bridge over a drainage canal is included in this work.

A new four-lane causeway will be constructed across Indian River from U.S. Highway No. 1 on the mainland to the new area boundary. A bridge across the Intracoastal Waterway and a traffic interchange at U.S. Highway No. 1 will also be required.

On the site: This item includes approximately 29 miles of new and rehabilitated road net within the new area including 4 miles of new four-lane road, 6 miles of new two-lane road, a causeway and bridge at Banana River connecting the new area with present facilities in the existing area, and approximately 19 miles of rehabilitated roadway throughout the new area.

(*c*) *Power transmission lines and substations.*—It will be necessary to construct 22 miles of 110-kilovolt overhead power transmission lines, two 110-kilovolt to 13.2-kilovolt substations, and 20 miles of 13.2-kilovolt overhead distribution lines.

(*d*) *Water mains.*—The project includes the installation of 14.5 miles of 20- to 24-inch water mains and connections.

(*e*) *Range support—utilities.*—Heating plant and distribution system: This system will consist of 2 miles of steam lines, 2 miles of steam return lines, and a 1,500-horsepower boiler plant.

Water storage and distribution system: The installation of 2.2 miles of waterlines, a 500,000-gallon storage tank, and a pumping station will be required.

Electric power distribution system: Approximately 2 miles of 13.2-kilovolt overhead distribution lines, a substation, and switching gear will be installed.

(*f*) *Range support—roads and parking areas.*—Road network: Roads within the support area consisting of approximately 28,400 square yards of paving will be required to support the new facilities.

Parking areas: Parking areas are also required to support the new facilities; approximately 58,000 square yards of paving will be laid.

(*g*) *Security facilities.*—This item includes 15 miles of security fences, lights, and four pass and identification buildings, one on each access road to the new area.

(*h*) *Range support—facilities.*—Maintenance building: This structure, consisting of 15,000 square feet gross area, will house the first increment of the range plant maintenance functions.

Warehouse: This building will contain 20,000 square feet of storage area for range support supplies, parts, and equipment. Additional storage facilities will be required in subsequent fiscal years as the program progresses.

Dispensary: A central dispensary will provide medical support for personnel in the immediate area and will support all other first aid stations in the new area. The building will contain 4,600 square feet of floor area.

JUSTIFICATION

After the decision was made to acquire the new land area at the Atlantic Missile Range for the launching of the flight vehicles for the manned lunar landing program, a study was made to determine the types and quantities of utilities required to support the launch flight facilities being requested in the fiscal year 1963 budget. This study revealed that the existing access roads, bridges, and canals were inadequate to support the scheduled flight launches. In coordination with the State of Florida and the Air Force, an access roads study was undertaken which indicated that the access projects requested herein will be required to move the quantities of traffic that will be entering the newly acquired area.

The primary utility systems proposed are the minimum required at this time to support the launch pads being requested in the 1963 program for the NOVA and the ADVANCE SATURN programs. When additional pads are requested in subsequent programs, additional utilities to support these pads will be programed concurrently.

The proposed extension of range utilities and the proposed construction of range support facilities and utilities are scheduled in accordance with launch site support requirements for the manned lunar landing program. Timely construction completion of these facilities in proper sequential order is essential to meeting the projected launch schedule.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$17,363,000
Canal dredging	$2,650,000	
Primary and access roads and bridges	7,260,000	
Exterior of the site	3,953,000	
5 miles of road from Haulover Bridge to Volusia County line	350,000	
Bridge over Haulover Canal	578,000	
1.3 miles of road	65,000	
Bridge	50,000	
Causeway road to U.S. Highway No. 1	1,240,000	
Bridge	1,270,000	
Interchange at U.S. Highway No. 1	400,000	
On the site	3,307,000	
4 miles of 4-lane road	800,000	
6 miles of 2-lane road, including causeway and bridge	1,870,000	
19 miles of rehabilitated road	637,000	
Power transmission lines and substation	2,340,000	
Power transmission lines	1,300,000	
2 substations	1,040,000	
Water mains	1,990,000	
Range support, utilities	1,390,000	
Heating distribution system	760,000	
Water distribution system	270,000	
Electrical power distribution system	360,000	
Range support, roads and parking areas	740,000	
Road network	260,000	
Parking areas	480,000	
Security forces	498,000	
Lighting	495,000	
C. Facility construction and modifications		1,200,000
Pass and identification buildings; 4 each (600 square feet at $30 per square foot)	$72,000	
Water storage tank	130,000	
Heating plant (5,000 square feet at $40 per square foot)	200,000	
Maintenance building (15,000 square feet at $24 per square foot)	360,000	
Warehouse (20,000 square feet at $15 per square foot)	300,000	
Dispensary (4,600 square feet at $30 per square foot)	138,000	
D. Equipment, instrumentation, and support systems		572,000
Maintenance, warehouse, and dispensary equipment	$22,000	
Boilers, pumps, and accessories	550,000	
E. Design and engineering services		2,865,000
Total estimated cost		22,000,000

Mr. THOMAS. Gentlemen, this completes the justification for the Atlantic Missile Range. We will come back in the morning at 10 o'clock. Thank you very much.

TUESDAY, MAY 1, 1962.

DEVELOPMENT AND TESTING OF X–15 RESEARCH AIRPLANE

Mr. THOMAS. Gentlemen, the committee will please come to order. Tell us for the record just what, in your judgment, was accomplished yesterday by the X–15, and what does it point toward?

Dr. DRYDEN. The X–15 yesterday attained an altitude of about 245,000 feet. The design altitude was 250,000 feet, so that the specifications laid down in the design of the aircraft were nearly fulfilled.

However, the airplane has a capability of going to much higher altitudes. The problem is not to attain higher altitudes but to get back safely.

I think the thrust of the rockets would enable it to climb perhaps to four times this height, but we are not assured at the present time that you could return safely. We will be pushing the altitude higher and watching closely the temperatures developed on the surface of the airplane and any other phenomena which are experienced to exploit the full capabilities of the airplane.

Following this program of measurement of the characteristics of the airplane, the airplane will be used for certain types of additional investigations, scientific measurements, and practical measurements of interest to the Department of Defense and ourselves.

The original thought with the X–15 was to explore space with a winged aircraft. The interest in a winged aircraft, of course, is the degree of controllability, the flight path, and the landing. The X–15, I believe, has landed within 1,000 feet or so of the intended landing point on every flight except one when we had a landing in one of the lakes up the line. However, the precision of landing is nearly comparable to that of a conventional airplane.

The X–15 was not designed for orbital flight. It will not withstand the entry from 18,000 miles per hour.

The knowledge which is being gained refers to control of the reentering flight path by means of a jet system and electronic devices.

The information from the X–15 is very important to the Air Force's DYNA-SOAR project which they intend to design for reentry from orbit.

In the long view, the Space Agency going to the moon, for example, does not need to develop a winged reentry. We can now afford to come down on a parachute because we will not do this every day.

In the case of a space station with men aboard, if we get this far, where we want to reenter, bring the people from up there down a winged vehicle, which could be controlled in its landing, would have considerable advantage over the parachute recovery.

If you go to possible military applications, which we do not foresee too clearly like the present strategic bomber operation, they can land almost anywhere in the world, they would think nothing of shifting the landing point by 1,000 or 2,000 miles if the situation demanded it.

I think if the military ever exploits space they will want to be able to vary the landing point at will. This can be done with configurations like the DYNA-SOAR.

There is another point. If you are going to do this you cannot have at every possible landing point a lot of electronic equipment to guide them in.

In our return from the moon we can afford to put in a good bit of ground equipment in order to enable us to be brought down near a certain place, whereas the independent operator will want to have all his equipment on board.

Just to take a ridiculous example, the big jet airplanes flying to fixed airports leave the steps at the airport and wheel them up so you can get off. Short range airplanes like to carry the steps on board the airplane to let them down.

The difference is that in going to the moon on these expeditions, which you do not do often, you can put a lot of special equipment on the ground because you want to land in a particular place; whereas if you are thinking of military operations you want the freedom to land anywhere and to be as nearly self-contained as you can be.

In the long run, as we see more clearly what the possible military uses are, probably the maneuverable type of spacecraft, which is a succession of the X–15–DYNA-SOAR line will be in the picture.

Mr. THOMAS. Do we understand you to say that the rockets in that plane could have gone another 5,000, 10,000, or 15,000 feet in altitude?

Dr. DRYDEN. As I recall the performance specifications, the rocket thrust will push it to a height of 1 million feet, which is nearly 200 miles. We are not sure he would come back safely from that height.

Mr. THOMAS. He was quoted in the paper as saying that he purposely shut off the rocket——

Dr. DRYDEN. Because he would have gone higher.

Mr. THOMAS. He would have gone higher. At what altitude was it in terms of miles?

Dr. DRYDEN. Nearly 50 miles, not quite.

Mr. THOMAS. He said the reason he shut them off was that he was afraid he would get in orbit.

Dr. DRYDEN. This is a figure of speech. That airplane could go twice as high, perhaps, as the MERCURY, but the airplane is not designed so you can get back.

Mr. THOMAS. Where does the air thin out, at 75 miles?

Dr. DRYDEN. It is already very thin. It is almost like a missile, a rocket projecting him up into the air and then he falls back. He has to change his attitude and come in gradually.

The airplane was designed with plenty of safety factors to come back from 250,000 feet.

Just what the limit is we do not know. We have approached it cautiously. Certainly the people working on the job think they will get to 300,000 feet within a reasonable time.

Mr. THOMAS. You mean the body of the plane was not damaged by heat when it came back into the dense atmosphere?

Dr. DRYDEN. No.

Mr. THOMAS. What was the body of the plane made of?

Dr. DRYDEN. Inconel X. It is a material which can operate at a temperature of 1,200° Fahrenheit.

Mr. THOMAS. If he was quoted correctly, he said he began to lose some sense of motion. As far as deleterious effects are concerned, there were none. He said he could have gone into orbit.

Dr. DRYDEN. As long as his engine was operating he was being pushed up with 4G. He explained some of the problem. He shut off because he was being pushed down.

If the motor had been left on it would have gone considerably higher. We don't want to do that because we are not sure he can get back safely.

Mr. THOMAS. Is it possible to take that same alloy and go up 100 to 150 miles and not have it burn up when it gets back into heavy atmosphere?

Dr. DRYDEN. The design would have to be somewhat different. This airplane does have a form of protection which was like that of the early ballistic missiles. It has a piece of metal which can absorb the heat pulse, but for a return from orbit it is almost certain we will have to go to a blading material like the ballistic missile.

Mr. THOMAS. Gentlemen, continuing with the construction program, we have worked over the big items to some degree with regard to the Army Missile Range.

FACILITY PLANNING AND DESIGN

Let us look at facilities and design. Insert CF3–1 in the record. (The page referred to follows:)

FACILITY PLANNING AND DESIGN

DESCRIPTION

The funds requested under this project are required for advanced facility planning and design on projects for which construction funds may be requested in subsequent budgets.

JUSTIFICATION

Long-range plans in several program areas must anticipate the need for the construction of facilities beyond the budget year for which estimates are being submitted. A considerable saving in time and and an increase in the accuracy of construction cost estimates is possible with the availability of an advanced facility planning and design fund which can be used to initiate the design of high-priority facilities prior to the enactment of project authorization and the appropriation of funds. Without this project, the only method by which such advanced design work can be initiated is through the use of the Administrator's emergency authorizations provided in the authorization act. The provision of the separate and identifiable advanced planning and design fund proposed by this project allows the emergency authorizations to be conserved for projects requiring the prompt initiation of construction, and permits advanced planning and design to be funded without the necessity of reprograming funds provided for other projects.

COST ESTIMATE

Total estimated cost, $10,000,000.

Mr. THOMAS. This is a long-range plan of $10 million covering engineering costs. Can you get along without this $10 million or do you have to have it? You have no specific use for it now?

Dr. DRYDEN. It is economical in the long run to do some engineering and some rough design before we furnish these cost estimates to you. We always have this problem when we come in with estimates based largely on experience. We would be able to be more precise had we put some money into engineering planning in preceding years. That is all this is, to enable some advance engineering planning of these items we bring to you each year.

Flight Research Center

Mr. Thomas. Insert CF4–A1, 3, 5 and B1 and B2 in the record. (The pages referred to follow:)

FLIGHT RESEARCH CENTER

Building additions	$1,332,000
Visual flight simulator	475,000
Total	1,807,000

BUILDINGS ADDITIONS

Description

Building additions to the main flight research center building are proposed. The additions total to approximately 42,000 square feet of space which will provide a net usable area of slightly over 31,000 square feet. About 21,000 square feet of the additional space will be used for shop and laboratory activities, and about 10,000 square feet for office space and other supporting activities.

Justification

The increasing workload at this station, particularly in connection with the X–15, the DYNA-SOAR, and the supersonic transport programs, is creating a requirement for additional shop and laboratory space. At present, the machine, sheet metal, and welding shops occupy 8,750 square feet of the calibration hanger. It is proposed to move these shops into the new technical services wing. The vacated area in the calibration hanger will be used to house simulators, altitude test chambers, and test tables for use in the development and testing of aircraft instrumentation and control systems.

Additional office space is urgently needed to alleviate existing crowded conditions (an average of only 65 square feet per person) and to provide working space for additional personnel to be added during the fiscal year 1963.

The additional shop area indicated in the drawing will permit necessary additions to the photographic laboratory, the radio room, data processing units, and the aircraft component shops and laboratories, other than the heavy-duty type of fabrication and repair shops.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$51,000
Utility connections	$35,000	
Paving	16,000	
C. Facility construction and modifications		1,201,000
Building (41,705 square feet at $28.80 per square foot)	$1,201,000	
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		80,000
Total estimated cost		1,332,000

VISUAL FLIGHT SIMULATOR

Description

A flight simulator is required with the capability of providing a projection of the outside view, controlled in response to the pilot's control movements and the performance of the simulated vehicle, to the pilot in a cockpit mockup. The facility will include—

(*a*) A projection system capable of a bright, controllable, wide-angle presentation of earth and sky.

(*b*) The cockpit, indicator, controls and other facilities required to provide flexibility and easy interchangeability of the pilot's display, field of vision, and control system.

(*c*) Required electronic equipment to modify the present general-purpose simulator to permit solving the problems involved in long duration high performance missions.

Justification

The success of a flight research program is critically dependent upon the provision of proper and adequate simulator equipment. The basic use of flight simulation equipment at the flight research center is for support of flight activ-

ity. Simulators have been found to be indispensable in the areas of flight guidance and planning, data reduction and analysis, pilot training, development of research procedures, and prediction of flight characteristics.

The flight research center, at present, has two static simulators: an X–15 simulator and a general-purpose simulator. These two pieces of equipment are limited to simulation with instrument cockpits, that is, blind flying. This limitation to instrument presentation is unacceptable, in many flight programs to be investigated in the future. Examples of such programs are recovery and landing research, navigation and energy-management problems, and complete mission simulation. All of these programs will rely heavily on the visual stimulus of the outside environment, and, for adequate simulation, this outside environment must be provided. The proposed equipment will provide this visual-environment capability for the present static simulators, and will thus permit investigation of a wider range of flight problems.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$15,000
Utility connections	$15,000	
C. Facility construction and modifications		30,000
Hangar modification	$20,000	
Projection dome	10,000	
D. Equipment, instrumentation, and support systems		350,000
Projection system	$150,000	
Cockpit	50,000	
Electronic controls and simulation equipment	150,000	
E. Design and engineering services		80,000
Total estimated cost		475,000

Mr. THOMAS. This is a flight research center, the home of the X–15. I have a notation here, $1,800,000. You have some building additions.

I have a longhand note that this is not all the construction to be located here this year. Is that correct?

Dr. DRYDEN. That is right.

GODDARD SPACE FLIGHT CENTER

Mr. THOMAS. Let us look at Goddard Space Center, insert page CF5–A1 in the record.

(The page referred to follows:)

Goddard Space Flight Center

Applied sciences laboratory	$3,175,000
Attitude control test facility	915,000
Conversion of dynamic test chamber	3,250,000
Development operations building	1,850,000
Launch phase simulator	3,915,000
Spacecraft operations facility	7,500,000
Tracking and telemetry laboratory	3,175,000
Total	23,780,000

Mr. THOMAS. You have seven items here for a total of $23,780,000. You have an applied sciences laboratory, $3,175,000; attitude control test facility, $915,000; conversion of dynamic test chamber, $3,250,000; development operations building, $1,850,000.

The launch phase simulator is $3,915,000; spacecraft operations facility is $7,500,000, and tracking and telemetry laboratory is $3,175,000.

This is mostly construction plus equipment. Is this the wrapup cost of all this?

Dr. DRYDEN. These are full costs.

APPLIED SCIENCES LABORATORY

Mr. THOMAS. Let us look at the applied sciences laboratory first. Insert pages CF5–A3 and 5.

(The pages referred to follow:)

APPLIED SCIENCES LABORATORY, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

It is proposed to construct a laboratory consisting of approximately 100,000 square feet of floor area in a ground floor, two additional floors, and headhouse space. The building will have a monolithic concrete frame and floor slabs with face brick masonry exterior walls. Antenna test rooms provided in the headhouse and roof slabs will be designed to accommodate antenna loads. Interior partitions will be of concrete block and movable metal. Offices, laboratory work space, and parking areas will be provided for about 350 people. The building essentially will be a duplicate of the space sciences laboratory with revisions and alterations required for the new site orientation. It will contain the necessary electrical, air conditioning, and ventilation systems for research and development of satellite payloads. Existing utility systems will be extended to the building and the central powerplant steam generating and chilled water capacity will be expanded as required.

JUSTIFICATION

This building will house the additional scientific personnel required for research and development of instrumentation for spacecraft and sounding rockets. Studies will be made on infrared radiation, cosmic rays, meteorites, solar physics, X-ray radiation, magnetic fields, and other geophysical phenomena. The functions of this laboratory will also include the development of vehicle-borne computers and the improvement of ground-based computers used to derive detailed orbital or flight path constants of space vehicles. Special equipment to be housed in the laboratory will include particle accelerators, leak detectors, mass spectrometer, vacuum and thermal testing tanks, balancing equipment, and gyro and hydraulic test stands.

The first and second floors will provide laboratories for studies in the areas mentioned and offices for the research personnel. The basement will provide space for building heat, ventilating, and electrical equipment, some equipment storage, additional laboratory and office space, and a small electronic instrumentation shop.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installations		$275,000
Water lines	$45,000	
Steam lines	30,000	
Sanitary and storm sewers	30,000	
Electric power and communications systems	70,000	
Roads and parking areas	100,000	
C. Facility construction and modifications		2,600,000
Building (100,000 square feet at $25 per square foot)	$2,500,000	
Addition to powerplant	100,000	
D. Equipment, instrumentation, and support systems		300,000
Special electrical system for laboratory use	$200,000	
Special air conditioning for high heat loss electrical equipment	100,000	
E. Design and engineering services		----------
Advanced design funds in the amount of $75,000 allocated from fiscal year 1962 funds.		
Total estimated cost		3,175,000

Mr. THOMAS. You state:

It is proposed to construct a laboratory consisting of approximately 100,000 square feet on the ground floor, two additional floors, and a headhouse space.

How many additional feet in the building besides the 100,000 square feet?

Dr. NEWELL. 100,000 square feet covers the entire project.

Mr. THOMAS. Are you sure that is correct, Dr. Newell?

Dr. NEWELL. That is correct.

Mr. ULMER. The wording there could have been improved.

Mr. THOMAS. What is the headhouse?

Dr. DRYDEN. A high bay.

Mr. THOMAS. Anyway, the 100,000 feet is it?

Mr. ULMER. Yes, sir.

Mr. JONAS. What have you been using for a laboratory there up until now?

Dr. NEWELL. The groups to be included here are largely those working on the applied aspect of the space science, meteorology work, and so on. Up until a short while ago these people were actually housed in space rented from the Navy at two locations.

We have brought them into Goddard just recently. They are very crowded.

Mr. JONAS. Facilities are available but they are overcrowded and you want new ones? Is that the answer?

Mr. WYATT. This laboratory started from scratch in 1959. The space Dr. Newell referred to is space we had at the Naval Research Laboratory and at the Naval Receiving Station.

The Naval Receiving Station is being abolished to make way for the Anacostia Freeway.

As part of the plan to bring these people into the single site at Beltsville, this part of the development is included.

The plot plan on CF5–A2 shows the existing facilities under construction as well as the proposed facilities.

Mr. THOMAS. How long do we expect these buildings to last?

Mr. WYATT. Indefinitely, sir.

Mr. THOMAS. You mean we will be in this program indefinitely?

Mr. WYATT. Yes, sir; we think we are here to stay.

Dr. DRYDEN. I think we will be in space indefinitely, as we have been and will be in aeronautics indefinitely.

Mr. THOMAS. You mean the more we learn the more we have to learn?

Dr. DRYDEN. I think this country is growing at quite a rate. Science and technology are growing. I do not believe they will go backward.

Mr. THOMAS. What are we going to do after we get up on the Moon?

Dr. DRYDEN. I think the answer is that at the present time we do not know.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

ATTITUDE CONTROL TEST FACILITY

Mr. THOMAS. Let us look at CF5–B1. Insert B–1, –4, and –5 in the record at this point.

(The pages referred to follow:)

ATTITUDE CONTROL TEST FACILITY, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

This facility will provide the Goddard Center with a functional attitude control laboratory comprising two buildings, four enclosed concrete pads, access roads, and utilities for testing complete spacecraft up to the size of the orbiting astronomical observatory. The coil building will be of frame construction, 60 by 60 by 60 feet on a concrete foundation with all materials selected for nonmagnetic properties. It will be located 1,400 feet west of the magnetic instruments test laboratory of the magnetic fields component test facility at the center of a 900-foot-radius nonmagnetic area acquired on permit from the Department of Agriculture. The one-story controls building will be of nonmagnetic construction 30 by 60 feet, with a full basement, and will be located between the coil building of the attitude control test facility and the magnetic instruments test laboratory of the magnetic fields component test facility.

The enclosed pads will be wihin the nonmagnetic area remote from all other buildings and will house reference standard magnetometers placed on 10-foot-square, nonmagnetic, concrete pads with 8-foot-high wooden-frame sheds over them. All-weather roads will be provided to connect the controls building and the coil building with the magnetic fields component test facility. Access to the pads will be by secondary roads.

Electric power will be furnished from the substation in the control and service building of the magnetic fields component test facility. A stationary compressor plant will be installed in the building to furnish compressed air for shaft power in the coil building of the attitude control test facility. Research equipment in the coil building will include a spherical coil system 40 feet in diameter. A pneumatic overhead hoist will be provided for spacecraft handling. Pneumatically energized shaft power will be available to drive positioning fixtures for changing spacecraft orientation and for moving instruments used to survey field contours surrounding the spacecraft.

Test operations will be conducted in the controls building which will provide adequate space for experimenters equipment in addition to facility control. Control console, current regulators, monitoring indicators, and associated electronic equipment will be housed in the controls building. Primary power will be obtained from batteries and battery chargers located in the control and service building of the magnetic fields components test facility.

JUSTIFICATION

Techniques for attitude control and space navigation which are either deliberately or unavoidably influenced by magnetic effects must be developed and refined. The proposed facility is required for the evaluation of the attitude control characteristics of scientific spacecraft. Meteorological satellites; geophysical, solar, and astronomical observatories; space probes; and other programs will benefit from the following capabilities to be provided by this facility:

(*a*) Measurement of the magnetic signature of large, flight configuration spacecraft. This feature will be unique in the proposed facility with regard to the size of payload that can be mapped and to the precision of measurements that can be made.

(*b*) Calibration of instruments over all ranges of interest when mounted in flight orientation within the influence of spacecraft induced fields.

(*c*) Electrical rotation of the field about a stationary spacecraft to permit evaluation of magnetic spin damping torques without the use of a large vacuum vessel and special air bearings.

(*d*) Electrical spin simulation to permit measurement and correction of the magnetic moment which causes precession and mutation of spin-stabilized spacecraft and guidance devices.

Cost estimate

(*a*)	Land acquisition		
(*b*)	Site development and utility installations		$154,000
	Waterlines	$48,000	
	Electric power and communications systems	25,000	
	Gaslines	9,000	
	Pneumatic system lines	33,000	
	Roads and parking areas	21,000	
	Fence repairs and additions	3,000	
	Grading and clearing	15,000	
(*c*)	Facility construction and modifications		320,000
	Coil building (3,600 square feet, at $44 per square foot)	$160,000	
	Nonmagnetic crane	20,000	
	Controls building (3,600 square feet, at $33 per square foot)	120,000	
	Enclosed pads	20,000	
(*d*)	Equipment, instrumentation, and support systems		381,000
	40-foot spherical coil	$156,000	
	Payload and instrument positioner	35,000	
	Magnetometers and reference standards	60,000	
	Control system and power supply	130,000	
(*e*)	Design and engineering services		60,000
	Coil design	$15,000	
	Control system and power supply design	15,000	
	Architectural and engineering services	30,000	
	Total estimated cost		915,000

Mr. THOMAS. This is the attitude control test facility. What is it? You say it is to be located 1,400 feet west of the magnetic instrument test laboratory and will be 30 by 60 feet.

Dr. NEWELL. It is actually more general than the term "Attitude Control Test Facility" would indicate. This is a magnetic test facility we must check out equipment not only for the use of magnetic forces in controlling the attitude of spacecraft—for example, this has been done with the TIROS weather satellite—but also for determining the magnetic field background of the spacecraft so we can make accurate measurements in space.

CONVERSION OF DYNAMIC TEST CHAMBER

Mr. THOMAS. You have a conversion of a test chamber. I have checked here a spacecraft operations facility, and then you show a simulator.

Dr. NEWELL. That is right.

Mr. THOMAS. Explain those three. Insert C–1 in the record; also insert C–2.

(The pages referred to follow:)

CONVERSION OF DYNAMIC TEST CHAMBER, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

This project proposes the conversion of the dynamic test chamber to a space simulator. In order to effect the conversion, it will be necessary to clean the chamber and add a solar simulator to the removable head. Liquid nitrogen cooled curtain walls will be installed within the vessel to provide a dark space heat sink temperature less than 100° K. when the solar simulator is in use and to provide programed wall temperatures between −65° and +100° C. when the solar simulator is not in use. The vacuum system will be extended by the addition of 25 diffusion pumps with baffles, and will increase the present vacuum from 1 mm. Hg to 1 x 10^{-8} mm. Hg. Additional stages of mechanical

pumping will be added to existing pumps. Approximately 50 helium panels will be installed to complete the vacuum system. The existing substation will be modified to provide 1,000 kilowatts of additional power.

JUSTIFICATION

The space environment facility approved for construction during the fiscal year 1962 is comprised of two stainless steel vacuum vessels 35 feet in diameter and 60 feet high that are duplicates in mechanical design. The primary difference between the chambers is that one chamber, the space environment simulator, contains a solar simulator in the top and nitrogen-cooled curtain walls and is capable of producing a vacuum of 1×10^{-8} mm. Hg; the dynamic test chamber does not contain these additional features and produces a vacuum of only 0.1 mm. Hg.

The space environment simulator is used in spacecraft testing which involves the effects of solar radiation and the coldness of outer space in combination with the vacuum environment. The dynamic test chamber is used for tests in which air resistance is of importance such as dynamic balancing, spin-up tests, solar paddle erection, and vibration tests. This chamber will continue to have this capability after its conversion to a space environment simulator.

The workload generated by the orbiting astronomical and geophysical observatory programs will overload the present solar simulator to the extent that one simulator will no longer be sufficient to carry the entire workload. It is estimated that the two solar simulators will be in use in excess of 40 percent of the time available on a 24-hour-a-day operating schedule.

Cost estimate

A. Land acquisition	----------
B. Site development and utility installations expanded electric and cooling tower water services	$120,000
C. Facility construction and modifications	----------
D. Equipment, instrumentation, and support systems	3,130,000
Vacuum system	750,000
Solar optics and lamps	715,000
Solar power supplies, starters, and wiring	360,000
Penetrations and plenum	125,000
Cryogenic pumping system	250,000
Heat transfer system	650,000
Instrumentation	280,000
E. Design and engineering services	----------
Total estimated cost	3,250,000

Mr. THOMAS. The big money is the equipment and instrument support system.

Dr. NEWELL. That is correct. The dynamic test chamber is necessary for simulating the conditions that this spacecraft and equipment will experience in space. It is part of our planned program to do as much as we can in checking out——

Mr. THOMAS. You will convert one of the old tunnels or is this a brand new piece of construction?

Dr. NEWELL. This is a conversion of one we have at Goddard in order to provide a vacuum which is 100 billion times more rarefied than the earth atmosphere at sea level.

DEVELOPMENT OPERATIONS BUILDING

Mr. THOMAS. What about this other building shown on page D–1, the development operations building? Insert that page in the record and also D–3.

(The pages referred to follow:)

DEVELOPMENT OPERATIONS BUILDING, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

This building will be of steel frame and masonry construction, air conditioned and humidity controlled, and will provide approximately 70,000 square feet of floor area on one floor. It will provide workspace and parking area for 100 people. In addition, it will provide space for a magnetic tape library, an instrument loan and repair facility, and a clean area for a satellite holding facility. It will also include an area for shipping and receiving functions.

JUSTIFICATION

This building will provide space for a magnetic tape library, an instrument loan and repair facility, a satellite holding facility, and an area for shipping and receiving functions.

Magnetic tape, both blank tape and that on which data has been recorded, requires storage in a temperature-humidity controlled area to avoid damage. This tape is presently stored in work space and hallways, and runs the constant risk of damage.

At present, there is no central location for instrument loan and repair. This situation is likely to lead to duplication in the procurement of instruments and in the fragmentation of the center's instrument repair capability.

A spacecraft and spacecraft component holding facility is required for the storage of spacecraft awaiting test either prior to launch, for followup shots, or while awaiting tests in various stages of manufacture prior to acceptance. Storage space is also required for various spacecraft components awaiting integration into spacecraft. A clean room condition is required in this area both for the normal storage of these units and because of the periodic inspections which must be made to assure launchready capability of the components and the spacecraft.

Shipping and receiving space is urgently required to provide service for both local and worldwide logistic support requirements. The present facilities at the Goddard Center are at the saturation point. The proposed building being located within the center complex will avoid the waste of manpower and transportation equipment utilized in traveling to rented space currently utilized for the storage, shipping, and receiving functions.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$250,000
Water lines	$25,000	
Steam lines	15,000	
Sanitary and storm sewers	20,000	
Electric power and communications systems	50,000	
Additional equipment for central powerplant	40,000	
Roads and parking areas	95,000	
Grading, clearing, and seeding	5,000	
C. Facility construction and modifications		1,475,000
Building:		
15,000 square feet of office space at $25 per square foot	$375,000	
55,000 square feet of openwork and storage space at $20 per square foot	1,100,000	
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		125,000
Total estimated cost		1,850,000

NATURE OF OPEN WORK SPACE

Mr. THOMAS. The cost is $25 a square foot for 15,000 square feet and $20 per square foot for open work and storage space.

Dr. NEWELL. The open work space is for satellite staging.

Mr. THOMAS. That will not cost $20 a square foot. You have just a floor and a roof.

Mr. WYATT. It requires air conditioning.

Mr. THOMAS. What do you mean by open space?

Dr. DRYDEN. No partitions.

Mr. WYATT. Open work space: We have a problem not only of working on the spacecraft itself but we need clean storage conditions.

Mr. THOMAS. You have a heavy concrete floor, a roof and four walls. Do you have utilities?

Mr. WYATT. Yes, sir. We must have a controlled environment for working on the spacecraft under clean conditions and the storage of a large amount of tape containing the data from the satellites we are flying. This has to be stored in a controlled environment so it does not shrink or expand, and distort the information.

Mr. THOMAS. Are you going to have them in vaults?

Mr. WYATT. I do not think vaults per se would be the right way to phrase it. It would be under controlled humidity and temperature controlled environments. It will be away from electrical disturbances which would change the record on the tape.

Mr. THOMAS. How are you going to do that, have a wall 2 feet thick?

Dr. NEWELL. You have to design the electrical wiring to provide for this.

LAUNCH PHASE SIMULATOR

Mr. THOMAS. Let us look at the launch phase simulator. Insert E–1, –4, –5, and 6 in the record.

(The pages referred to follow:)

LAUNCH PHASE SIMULATOR, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

This project provides for the construction of a combined environment facility to be employed in the test and qualification of scientific unmanned spacecraft. The facility will be capable of subjecting spacecraft of the CENTAUR class and smaller to realistic simulation of the significant temperature and acceleration-spin-vacuum.

The facility will comprise a test capsule mounted on a 65-foot radius rotating arm, a prime mover system, related environmental systems and support equipment, and an operations building. Spacecraft will be mounted within the test capsule and subjected to steady state acceleration loads resulting from centrifugal action as the arm rotates. The length of the arm is dictated by the size of spacecraft to be tested in the facility and by the maximum acceleration gradient produced along the thrust axis of the spacecraft under test that is consistent with realistic testing. It will be possible to test specimens 10 feet in diameter and 15 feet in length with an acceleration gradient of 20 percent. The facility will furnish 30 g's acceleration for spacecraft weighing up to 8,000 pounds and 50 g's for spacecraft of 1,000 pounds and less. Vibratory excitation will be imposed simultaneously with steady state acceleration by means of an electronically controlled vibration shaker system with the vibration shaker located near the outboard end of the capsule at the spacecraft mounting interface. A spin table, that can be employed interchangeably with the vibration shaker, will be included for testing small spin stabilized spacecraft. The test capsule will serve the dual purpose of a vacuum vessel and a streamlined aerodynamic shroud. Its design will eliminate transverse wind loads on the specimen and minimize the power required to overcome aerodynamic drag. A vacuum of 10^{-5} mm Hg will be achieved within the test capsule for combined environment tests and to eliminate mechanical effects of the atmosphere on spacecraft under

spin test. High performance mechanical vacuum pumps will be employed for evacuation. The test capsule will be designed to accommodate interior mounting of radiant heating and cooling elements for use when test programs require simulation of the temperature environment encountered during launch. The temperature extremes will be from −65°C. to 100°C. with provisions for localized heating to higher temperatures.

Operation of the facility will be conducted in an operations building located adjacent to the simulator area. This building will provide a usable area of approximately 10,000 square feet for supporting services, spacecraft staging, test control, and monitory activities. Equipment requiring direct tie-in with the simulator will be located in an enclosure surrounding the hub of the simulator. The simulator will be set in a concrete pit whose sidewalls will provide safety protection. The facility will be designed for all-weather operation. Data acquisition will be coordinated with the automatic data processing system of the Goddard Center.

JUSTIFICATION

The ever-increasing complexity, size, and missions of scientific spacecraft dictates the need for a test facility that will permit the straightforward and accurate determination of all significant failure-inducing effects actually encountered during the launch phase of space flight. The facility is needed to secure the highest possible level of confidence in spacecraft launch integrity for the NASA missions scheduled during the period 1964–70 and beyond, such as the geophysical, meteorological, and communication satellites and space observatories.

Scientific satellites and space probes encounter severe exposure to failure-inducing stresses during launch. During this period they are subjected to the effects of simultaneously imposed acceleration, vibration, pressure change, and temperature change. The stress patterns produced throughout spacecraft during launch are so complex that prediction of system performance under these conditions is not amenable to a theoretical approach. Developmental tests of system prototypes and proof tests of actual spacecraft intended for flight are therefore required.

Current laboratory techniques for testing the ability of spacecraft to survive launch employ single environment simulation equipment. Such equipment cannot impose the additive stresses and interactive environmental effects actually encountered during launch. Examples of these effects are as follows:

(*a*) A spacecraft structural member, such as a pressure vessel, may successfully survive consecutive exposure to acceleration, vibration, vacuum, and temperature yet fail due to stress additions occuring when these same environments are imposed simultaneously.

(*b*) Most vibration failures are associated with resonance phenomena. However, system resonant frequencies can be significantly modified by superimposed steady-state acceleration.

(*c*) The simultaneous application of steady-state acceleration and reduced pressure such as encountered during upper stage propulsion can cause corona or other electrical malfunction due to small displacements of conductors or relay contacts. This phenomenon may not be disclosed during single environment tests.

(*d*) Steady-state acceleration can preload vibration isolators so as to diminish their effectiveness and can displace isolated elements to the extent of causing violent impact.

These effects can be partially counteracted by the overdesign of the spacecraft and by overtesting. However, they do remain as elements that can negate an entire mission; they may also result in an excess of structural mass with an attendant sacrifice in capacity to carry functional scientific experiments.

With the coming generations of large and complex scientific spacecraft, the problem of resolving these effects becomes so great that verification can best be conducted by ground-based realistic simulation of the combined launch environments. The proposed facility will fulfill this requirement. Although single environmental test equipment will continue to be vitally important to diagnostic development efforts, the launch phase simulator will be capable of revealing effects not attainable in any other way.

82964—62—pt. 3——49

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$250,000
City waterlines	$10,000	
Chilled waterlines	15,000	
Steam and condensate return lines	15,000	
Sanitary and storm sewerlines	10,000	
Electric power and communications systems	125,000	
Roads	60,000	
Clearing and grading	15,000	
C. Facility construction and modifications		900,000
Operations building (10,000 square feet at $20 per square foot)	$200,000	
Simulator enclosure (32,000 square feet at $20 per square foot)	640,000	
Special foundations	60,000	
D. Equipment, instrumentation, and support systems		2,695,000
Prime mover (package unit)	$1,395,000	
Arm and counterbalance	290,000	
Operations controls	230,000	
Data handling equipment	100,000	
Vibrating table	330,000	
Spin table	70,000	
Vacuum pumps	100,000	
Aerodynamic capsule	130,000	
Temperature conditioning	50,000	
E. Design and engineering services		70,000
An additional $85,000 has been allocated from fiscal year 1962 funds.		
Total estimated cost		3,915,000

NATURE OF LAUNCH PHASE SIMULATOR

Mr. THOMAS. What is this? Is this duplicated elsewhere in the system?

You state it will be possible to test specimens 10 feet in diameter and 15 feet in length with an acceleration gradient of 20 percent. What do you mean by that?

Dr. NEWELL. The problem here is to provide for unmanned spacecraft in order to be sure the spacecraft will work after it gets into space. When you state an acceleration gradient of 20 percent we are talking about the difference in force on one side of the spacecraft from the force on the other side. In other words, the tendency to pull the spacecraft apart, this is the big thing the spacecraft experiences.

Mr. THOMAS. You show 42,000 square feet more of construction. How many of these simulators do we have now? This is the third one we have run into.

Dr. NEWELL. This will be the only one of its kind. This combines the longitudinal accelerations with vibration.

Mr. THOMAS. You have a lot of different models here. Can't you get one model to do all the work?

Dr. NEWELL. I wish we could. Unfortunately there are different conditions one has to check out.

As you will note, this is the simulator for the launch phase. That is entirely different from going into orbit.

Mr. THOMAS. Is this the entire wrap-up cost?

Dr. NEWELL. Yes, sir.

Mr. THOMAS. What is the engineering cost charged here? Is it $70,000? Is there an additional engineering cost?

Mr. WYATT. That is from the advance design funding we discussed a few moments ago we had this year where we have done $85,000 worth of advanced design work.

TRACKING AND TELEMETRY LABORATORY

Mr. THOMAS. Let us put in the record pages CFS–G–1 and G–3. This is the tracking and telemetry laboratory.

(The pages referred to follow:)

TRACKING AND TELEMETRY LABORATORY, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

This project covers the construction of a laboratory consisting of approximately 100,000 square feet of floor area in ground floor, two additional floors, and headhouse space. The building will have a monolithic concrete frame and floor slabs with face brick masonry exterior walls. Antenna test rooms provided in the headhouse and roof slabs will be designed to accommodate antenna loads. Interior partitions will be of concrete block and movable metal. Offices, laboratory work space, and parking areas will be provided for about 350 people. The building essentially will be a duplicate of the space sciences laboratory with revisions and alterations required for the new site orientation. It will contain the necessary electrical, air-conditioning, and ventilation systems for research and development of electronic and optical tracking and telemetry equipment. Existing utility systems will be extended to the building and the central powerplant steam generating and chilled water capacity will be expanded as required.

JUSTIFICATION

This building will house the additional scientific personnel required for research and development of ground support instrumentation for tracking and data acquisition systems. Studies will be made on optimum transmission, modulation, and detection systems, low-noise preamplification systems, cryogenics for high-capacity date reduction systems, spacecraft ground control systems, ultrasensitive antenna systems, optimum feed and multiple feed antenna systems, antenna drive systems, timing systems and VLF propagation studies. The functions of this laboratory will serve to develop and improve new and existing tracking and data acquisitions ground support systems.

The first and second floors will provide laboratories for sutdies in the areas mentioned and offices for the research personnel. The basement will provide space for building heating, ventilating, and electrical equipment; some equipment storage; additional laboratory and office space; and a small electronic instrumentation shop.

Cost estimate

(*a*) Land acquisition		
(*b*) Site development and utility installations		$275,000
Water lines	$45,000	
Steam lines	30,000	
Sanitary and storm sewers	30,000	
Electric power and communications systems	70,000	
Roads and parking areas	100,000	
(*c*) Facility construction and modifications		2,600,000
Building (100,000 square feet at $25 per square foot)	$2,500,000	
Addition to powerplant	100,000	
(*d*) Equipment, instrumentation, and support systems		300,000
Special electrical system for laboratory use	$200,000	
Special air-conditioning for high heat loss electrical equipment	100,000	
(*e*) Design and engineering services (advanced design fund in the amount of $75,000 allocated from fiscal year 1962 funds)		
Total estimated cost		3,175,000

SPACECRAFT OPERATIONS FACILITY

Mr. THOMAS. Insert the description of the spacecraft operation facility on page CF–5, F–1 and also the cost estimate on F–4.

(The material referred to follows:)

SPACECRAFT OPERATIONS FACILITY, GODDARD SPACE FLIGHT CENTER

DESCRIPTION

A spacecraft operations facility is proposed for construction as an addition to the central flight control and range operations laboratory. The new facility will consist of approximately 70,000 square feet of floor area in a basement and two floors. The building will be of concrete and steel frame with face brick masonry exterior walls similar to the existing building and will be designed to accommodate heavy antenna loads in the roof. Office, work space, and parking area will be provided for approximately 150 people. The building will provide space for critically needed data reduction, control center, computation, and communications equipment which is included in the project. Because of the special demands of this type equipment, around-the-clock, all-season air conditioning will be provided. In addition, special electric power and mechanical services will be provided for the data-handling equipment and related laboratory area.

Cost estimates

A. Land acquisition		
B. Site development and utility installations		$400,000
Waterlines	$25,000	
Steam lines	15,000	
Sanitary and storm sewers	10,000	
Communications and electrical power systems	80,000	
Parking area	60,000	
Road alterations	10,000	
Addition to emergency power system	50,000	
Addition to central powerplant	150,000	
C. Facility construction and modifications		1,950,000
Building (70,000 square feet at $28 per square foot)	1,950,000	
D. Equipment, instrumentation, and support systems		5,000,000
Data reduction equipment:		
Large-scale digital data processor	$1,500,000	
Small-scale digital data processor	600,000	
Tape evaluation equipment	200,000	
Analog to digital conversion equipment	500,000	
Printers, plotters, and electronic accounting machine equipment	200,000	
Control centers:		
Display projection equipment	600,000	
Buffer equipment	250,000	
Information distribution system	455,000	
Digital and static display equipment	107,000	
Consoles, lighting control, screen, cables, checkout, and repair equipment	100,000	
Computation equipment:		
High-speed printer	50,000	
Plotter	50,000	
Communications equipment:		
Video tape recorders	150,000	
Magnetic tape recorders, voice	90,000	
Communications control board	20,000	
Microwave terminal equipment	128,000	
E. Design and engineering services		150,000
Total estimated cost		7,500,000

JET PROPULSION LABORATORY

Mr. THOMAS. Let us look at the Jet Propulsion Laboratory. You have six items here totaling $10,360,000.

Insert the summary sheet CF6–A1 in the record.

(The page referred to follows:)

Jet propulsion laboratory

Addition to fabrication services building	$605,000
Data operations and command facility	2,420,000
Engineering mechanics building	3,045,000
Additions to materials research laboratories	610,000
Telecommunications laboratory	2,860,000
Utility installations	820,000
Total	10,360,000

ADDITION TO FABRICATION SERVICES BUILDING

Mr. THOMAS. Insert page CF6–A3 and A5. This is your fabrication services building; $605,000.

(The pages referred to follow:)

ADDITION TO FABRICATION SERVICES BUILDING, JET PROPULSION LABORATORY

DESCRIPTION

An addition is requested for the fabrication services building currently under construction. The addition will provide approximately 18,000 square feet of floor space, and will include a sheet metal shop, machine shop, weld shop, assembly room, metal stores room, tool crib, and offices. The building will be a high-bay structure, one story, completely air conditioned, and of permanent-type construction similar to the fabrication services building.

JUSTIFICATION

The first phase of the fabrications services building, currently being constructed, will consist of a machine shop, inspection rooms, and offices. The sheet metal shop, weld shop, assembly room area, and metal stores area remain in the existing machine shop building. This means that the personnel and functions of this division will be widely separated, and must rely on short-line communications between supervision and key personnel in both areas.

The transport distance between the new facility and the existing fabrications shop is approximately 1 mile round trip. Work in process in the new fabrications shop that requires sheet metal or weld service will have to be shuttled by truck between the two buildings. Approximately 50 percent of the work in spacecraft and environmental test equipment requires this type of intermittent service. Raw stocks will also require transport between the two buildings.

The proposed addition will insure the more effective operation of the Laboratory's fabrication facilities by consolidating all fabrication division personnel, by eliminating duplicate equipment, and by discontinuing the inefficient shuttle service between two areas. Upon completion of the fabrication services building and the addition proposed in this project, the existing shop building will be demolished.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$25,000
Grading, paving, sidewalks, and landscaping	$5,000	
Substation	5,000	
Utility connections	15,000	
C. Facility construction and modifications		435,000
Building (18,000 square feet at $24.20 per square foot)	$435,000	
D. Equipment, instrumentation, and support systems		100,000
Welding shop equipment	$28,500	
Saw shop equipment	8,300	
Sheet metal shop equipment	63,200	
E. Design and engineering services		45,000
Total estimated cost		605,000

Mr. THOMAS. You are already on the side of a hill. Where are you going to put this?

Mr. WYATT. This goes down to the south end of the laboratory space where we are grouping the general services and the supporting facilities for the laboratory.

Mr. THOMAS. How much land do we have there altogether?

Mr. DIXON. 146 acres.

Mr. THOMAS. We bought a few acres last year on the side of a hill. What did we pay for that land?

Mr. WYATT. The hillside land was about $300,000.

Mr. THOMAS. How much was that an acre?

Mr. WYATT. About $5,000 an acre.

Mr. THOMAS. How many acres did we buy last year?

Mr. WYATT. I believe it was the little chunk shown clear down at the bottom of page A–3. We paid $15,000 for it.

Mr. THOMAS. How many acres?

Mr. WYATT. 3.4 acres, sir.

DATA OPERATIONS AND COMMAND FACILITY

Mr. THOMAS. Insert in the record pages CF6–B1, CF6–B3, and CF6–B4. This is data operations and command facility; $2,420,000.

(The pages referred to follow:)

DATA OPERATIONS AND COMMAND FACILITY, JET PROPULSION LABORATORY

DESCRIPTION

This project proposes the construction of a 53,800-square-foot laboratory-office building to provide the facilities for the computers, and for the operation and control centers required for the lunar and planetary programs. The facility will be of permanent-type steel or concrete construction and completely air conditioned. It will be designed to house analog and digital computers, a maintenance area, supporting laboratories, engineering and scientific display and analysis areas, status plotting boards, operations areas, a communications center, and exhibit areas. It will also contain conference rooms and offices for the technical personnel engaged in work in these areas.

The building will consist of two stories above ground, a basement, and a mechanical equipment room on the roof which will house air handling equipment. The basement will contain the mechanical equipment room, data and spare equipment storage areas, research equipment maintenance laboratories, a communications room, a crypto room, and a data processing laboratory.

The first floor will house the main data operations and control areas, communications and control rooms, a space sciences area, a customer engineering area, a spacecraft analysis area, a data conversion area, conference rooms, a control lobby, and a TV display room. The second floor will accommodate the engineering data display and evaluation area, scientific data display and evaluation areas, conference rooms, a data library, offices, and a standby room. The building will be structurally designed for the possible future addition of a third floor.

JUSTIFICATION

The data operations and command facility is planned as the mission operations command center from injection to the completion of a particular unmanned lunar or planetary mission. Preinjection tracking information received from the Atlantic Missile Range will be evaluated and relayed to the deep space network as anticipatory information to facilitate the acquisition of the vehicle by the deep space facilities. When the spacecraft has been injected, the tracking data received from the deep space facilities will provide the necessary inputs to enable the command center to calculate the transit trajectory orbit. Real-time orbit determination calculations will be performed to establish the magnitude and direction of the trajectory corrections required. Appropriate commands will be initiated at the command center and transmitted to the spacecraft via the deep space network facilities.

The data operations and command facility will receive, record, and, where appropriate, display the spacecraft data, both engineering and scientific, for diagnostic and command decision purposes. Real-time and selected near-real-time data will be made available to the mission operations personnel and participating scientists, so that any necessary revisions and modifications to the sequence of scientific experiments may be determined and implemented during the spacecraft operating life. In addition, the facility will provide raw and processed data to the participating scientists for later analysis and interpretation.

At present the data operations and command functions required for the RANGER type spacecraft and missions are being carried out in portions of 4 buildings and in 16 rented trailers. These areas do not include office space for the additional personnel required for future operations. As the lunar and planetary programs develop, the concurrent schedules, special processing and display requirements, greatly increased volume of data, greater mission life times, and more complex command and decision functions will exceed the maximum capability of these interim facilities. The proposed new facility will allow the 150 personnel engaged in data operations and command functions to be consolidated, will permit the rental trailers to be evacuated, and will eliminate the need for the rental of additional off-laboratory space. The geographical separation of certain of the functions in the data operations and command areas would impose great handicaps on the successful accomplishment of the lunar and planetary programs.

A review of currently planned and projected unmanned lunar and planetary projects and missions reveals the need for a single facility devoted to these projects to be operating on a near full-time basis shortly after its earliest completion. When it is realized that joint lunar and planetary operations will be conducted concurrently beginning in the mid-1962's, it becomes even more urgent that a separate facility to support these projects in a timely and closely integrated fashion be provided.

Cost estimate

A. Land acquisition	
B. Site development and utility installations	$125,000
Grading, paving, sidewalks, and landscaping	25,000
Substation	60,000
Utility connections	40,000
C. Facility construction and modifications: Building (53,800 square feet at $28.40 per square foot)	1,495,000
D. Equipment, instrumentation, and support systems	800,000
Office equipment	20,000
Communications equipment	15,000
Stand-by power system	55,000
Special display status boards and projection equipment	213,000
Computing equipment	265,000
Data handling equipment	232,000
E. Design and engineering services	(1)
Total estimated cost	2,420,000

[1] Fiscal year 1962 funds in the amount of $140,000 have been allocated for advanced design services.

ENGINEERING MECHANICS BUILDING

Mr. THOMAS. Let us look at the engineering mechanics building; $3,045,000. Put pages CF6–C1 and C3 in the record.

(The pages referred to follow:)

ENGINEERING MECHANICS BUILDING, JET PROPULSION LABORATORY

DESCRIPTION

This project proposes the construction of a 100,000 gross square foot building of which approximately 40,000 square feet will be in offices and 60,000 square feet in laboratories. The building will be multistoried with a full basement, air conditioned, and of permanent type steel or concrete construction. The laboratories will be of various sizes to accommodate all types of laboratory work. They will be designed around a utility core which will provide the flexibility of changing from one function to another.

JUSTIFICATION

The space sciences division of the Jet Propulsion Laboratory has the primary technical responsibility for the NASA's lunar and planetary programs. The personnel of this division are currently scattered in five separate buildings and in rented laboratory-type trailers. Some consolidation of the division personnel will be possible upon completion of the space sciences laboratory authorized in the fiscal year 1961 program and currently under construction. The additional space to be provided by the building proposed in this project will accommodate the balance of the division personnel who cannot be housed in the space sciences laboratory, and will provide office and laboratory space for the anticipated personnel growth of this division.

The construction of a permanent building of this type will permit substandard buildings to be vacated and demolished, and will allow rented trailers and off-laboratory rented space to be evacuated. The proposed building will provide office and laboratory space for a total of approximately 305 employees.

Cost estimate

A. Land acquisition	
B. Site development and utility installations	$95,000
Grading, paving, sidewalks, and landscaping	20,000
Substation	45,000
Utility connections	30,000
C. Facility construction and modification: Building (100,000 square feet at $27 per square foot)	2,700,000
D. Equipment, instrumentation, and support systems	
E. Design and engineering services	250,000
Total estimated cost	3,045,000

PURPOSE OF LABORATORY

Mr. THOMAS. You show a building for $27 a square foot.

Mr. DIXON. C–1 is an engineering mechanics building. We now have our employees at JPL, various engineers and technicians, located in a series of trailers all on top side. I have a picture here. There are 150 of these trailers. Trying to get these people to work together and move from one trailer to another is a most difficult operation to accomplish. We propose to put them in this engineering mechanics building so they can continue both their laboratory work and their planetary mission activities.

This will help us to operate more efficiently and get these people together so they can carry out their work better.

I have been up there through the trailers and I don't know how they get as good a job done as they do.

Mr. THOMAS. This is all Federal expenditure?

Mr. DIXON. Yes.

Mr. THOMAS. Does the Government own all the land?

Mr. DIXON. Yes, land and facilities.

LAND CONDITIONS

Mr. THOMAS. $27 a square foot is a little high for that type of construction way out there in that gully. If you ever get a good hard rain you will get the whole thing covered up.

Mr. DIXON. This will be at ground level.

Mr. THOMAS. I can see it now.

Mr. DIXON. This will be laboratory-type construction. They can carry out some laboratory work in the buildings.

Mr. RHODES. The chairman has a point there.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

Mr. RHODES. You do have mountains sliding down into the valley, as anyone knows who is acquainted with this area.

Mr. THOMAS. They have that heavily sodded. The only part of the compound they were watering was the mountainside.

Mr. DIXON. They have done very well in their planning. They used cactus where you water it just slightly and it covers the hillside and prevents this sliding. They have done a fine job in their planning.

They have gone up the hill about as far as they can.

Dr. DRYDEN. They have been on the site about 16 years. I know of no problem they have had in land sliding.

TRAILER RENTAL

Mr. BOLAND. What do you pay for rented space?

Mr. DIXON. 150 trailers and we are paying $200 to $300 per month depending on the length of time you have them. The rate goes down the longer you have them.

Mr. THOMAS. You mean you are renting the trailers? You have already bought them three times. Why didn't you buy them to start with?

Mr. DIXON. If we keep renting them we will have bought them several times.

Mr. THOMAS. Answer Mr. Boland's question. What rent are you paying per month for one of those little trailers? It looks like it is about 6 or 7 feet by 19 or 20 feet.

Mr. MYERS. They are about 10 feet wide and 40 feet long. They are between $200 and $300 a month depending on how long you rent them.

Mr. BOLAND. $300 a unit?

Mr. MYERS. Yes, sir, up to $300 per month.

Mr. BOLAND. How many units do you have?

Mr. MYERS. 150.

Mr. BOLAND. What is the total rent bill a year?

Mr. MYERS. Running about $336,000 the last time I checked. It varies depending upon the number.

Mr. JONAS. $336,000 for rent?

Mr. MYERS. That is right.

Mr. THOMAS. You bought the air-conditioning unit, did you not? I don't think I remember seeing those. They are ordinary window units.

Mr. MYERS. These are on the side of the hill. We also have to have the sidewalks to get to and from.

Mr. JONAS. You built the sidewalks?

Mr. MYERS. Yes, that doesn't come into the rent.

Mr. BOLAND. Who built the sidewalks?

Mr. MYERS. We did.

Mr. BOLAND. How many years have you been renting the trailers?

Mr. WYATT. We are in our third year now. We started off with 6, 8, or 10, and as the laboratory size increased we have had to increase the number of trailers. We considered them temporary in the sense there is a construction program out there which together with what we are requesting here will eliminate the need for them.

DEVELOPMENT OF THE LABORATORY

Mr. BOLAND. When did you first ask for construction money for this type of project?

Mr. WYATT. The first construction money under NASA was requested in fiscal year 1959 supplemental.

Mr. BOLAND. For this particular building?

Mr. WYATT. Not this particular building.

Mr. BOLAND. How about this particular building? When did you first make the request for this kind of building?

Mr. WYATT. This is the first year.

Mr. BOLAND. Why didn't you make it a couple years ago?

Dr. DRYDEN. We had a master plan developed. The laboratory grew up with temporary buildings under the Army. Very early after we took it over we said we do not want to continue this hodgepodge assembly of miscellaneous buildings. Let us get a master plan for the site with an eye to the future, and then we would begin to make an improvement program in increments.

The first request was made in 1959. We also had some funds in 1960 and 1961.

Mr. WYATT. I do not have total amounts handy. If I recall correctly they are on the order of $12 to $15 million.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

Mr. OSTERTAG. What was the basic reason for locating here?

Dr. DRYDEN. This is a laboratory that belonged to the Army, developed under the Army and Air Force, was transferred to us 3 months after the establishment of the space agency in October 1958. At that time the title to the buildings, land, and equipment passed to the new organization. We assumed the then existing Army contract and we have, of course, negotiated new contracts each year with the California Institute of Technology for operation of this facility, which is Government owned.

MANAGEMENT OF THE JET PROPULSION LABORATORY

Mr. THOMAS. This is the only facility that we let a nonprofit corporation operate for us where we own all the land, all the equipment, and pay all the bills; is that right?

Dr. DRYDEN. I am not sure it is the only one in the Government. It is the only one in NASA.

Mr. THOMAS. There are plenty of them in the Government, unfortunately. But this is the only one in the NASA setup. You pay a fee of $1,200,000?

Dr. DRYDEN. The estimated fee for 1963 will be $1,250,000 based on a total program estimated at $213 million for 1963.

Mr. THOMAS. You have your own administrative force checking on it?

Dr. DRYDEN. We have a western operations office with a relatively few people supervising it.

Mr. WYATT. Approximately six people on site from NASA.

Mr. THOMAS. As well as I remember, your supervising office has 120 people.

Dr. SEAMANS. The total western operations office.

Mr. THOMAS. At $5 per square foot per year rent you are paying on the building.

Dr. DRYDEN. If NASA had been built up from scratch as a completely new organization, it would not yet be in full operation in any kind of a space program. The way the space program was started, the way NASA was started was an assembly job, taking Huntsville from the Army, taking a group of several hundred people from the Naval Research Laboratory, taking the old NACA, all going organizations. We have not changed that form of operation. You have 3,000 people welded together in a team. You cannot change that very quickly to some completely different system.

I agree with Mr. Thomas that, starting from scratch, NASA as well as NACA, would not develop national laboratories of the AEC type that are operated by contractors. Most of our expansion is occurring at existing Government centers. This is a situation we inherited with the formation of NASA. It is very difficult to change it on short notice without disrupting the whole program that they are carrying out.

Mr. EVINS. Two wrongs do not make a right. There is no need perpetuating something when you recognize an error. Do you not think there should be a little flexibility or a little change?

Dr. DRYDEN. I do not know that it is an error. The background of NACA was such as to have the skills to organize and do the work in Government laboratories. As you know, there are other agencies of Government which did not have these personnel resources that have operated largely in the other fashion. I was saying as a personal thing that were I starting from scratch, I would not choose to operate this way. I do not think it is wrong. I do not think the Government could get its work done without having used this method in some circumstances. It has just been released in the press today, a study made by the Bureau of the Budget of this whole situation of Government-owned and privately operated laboratories as well as other forms of research organizations used by the Government.

They have set forth some recommendations with respect to policies affecting these various types of organizations. These policies, of course, as I recall from seeing the draft of the report, are policies that we are now following.

Mr. THOMAS. That report was made by the space agency, military, AEC, and Civil Service Commission. Of course, the fundamental thing, which goes back to the old military-industrial complex whereby the military pulled an end run to avoid civil service pay scales—let us lay it on the line and be frank about it. I cannot see any earthly excuse for paying those people out there a salary that is out of line with what everybody else is getting who are doing exactly the same or similar work. It goes to one fundamental defect, which is the fault of us on this side of the table and not you gentlemen. You cannot get high-grade people—I do not mean to cast any aspersions, I do not know of any finer people on earth than are in this room here; if you were not fine, you would not be doing the job you are doing—but it really sticks in my crop to see the military take that end run when the Congress really ought to take the problem squarely in hand and do something about it. You have to pay salaries in this Government up to thirty and thirty-five thousand dollars a year. Here is the biggest corporation on earth competing with industry. We have two or three people in this room who came from industry, who were making at least two and three times what the Government is paying them. That is morally wrong. The military is getting around this by going to the nonprofit corporation or even not altogether nonprofit for the simple reason that here is a private corporation doing 100 percent Government work, paying salaries fifty, sixty, seventy thousand dollars a year, and the taxpayers are paying for it. We are going to have to wrestle with the problem and look it squarely in the face. When we bring this bill to the floor, I am going to say my piece on it.

STATE UNIVERSITY
JUL 5 1962
MANHATTAN, KANSAS

As far as I am concerned, as Mr. Evins has pointed out, you have a contract with these people; but I certainly would hope when it expires, if we do not have a decent pay scale, that we try to make an example here. As far as I am concerned, I am willing to help. It has got to be done. But it is not right to the other people in the organization to see this rank discrimination by virtue of a little end run. That is all it is. I do not think anybody is indispensable. No unit is indispensable. We will get the work done.

MANAGEMENT SERVICES OF CAL TECH

Mr. JONAS. I think at this point it would be well to have Dr. Dryden just dictate into the record what we get for the $1,250,000 we pay Cal Tech.

Dr. DRYDEN. We get technical management.

Mr. THOMAS. You read that into the record before, but we will put it in here again.

(The material referred to follows:)

The fee of $1,250,000 paid Cal Tech is an amount the institute has held to be the minimum payment for their undertaking the overall management of the Jet Propulsion Laboratory during fiscal year 1963 encompassing an estimated total program of $213 million. The institute has stated that it requires "a minimum fee which in its best judgment is necessary to provide it sufficient protection and reward to enable it to contribute to the space effort without jeopardizing its ability to discharge its educational responsibilities and its future." The management fee in 1962 is $950,000 for an estimated total program of $145 million. This management fee is regarded by NASA as income or profit rather than a reimbursement for identifiable actual costs incurred. Cal Tech acknowledges that it looks upon its operation of JPL as an income-producing activity, and contends that a management fee is essential if it is to continue to supervise effectively a program which is many times the size of its total academic activities.

Dr. DRYDEN. We get the technical management of the unmanned lunar and interplanetary programs. I do not have the number in mind, but it is a total contracting effort of $145 million or thereabouts for fiscal year 1962 and estimated $213 million for fiscal year 1963.

Mr. JONAS. That is the point the chairman made. All this general language is already in the record. I meant in A B C's. What actually does Cal Tech do? It has already been brought out again and repeatedly that we own the land, we own the equipment, we pay all the salaries. You say we buy this management. We do that when we pay the salaries. What does Cal Tech contribute? That is the question we want answered.

Dr. DRYDEN. They make recommendations as to program. They function, as nearly as it is possible for a nongovernmental agency to function, like one of our centers who make proposals, which are adopted or rejected or modified by our headquarters people.

We look to them to meet with scientists and other agencies to talk about lunar and interplanetary programs. We look to them for scientific leadership. They are the people who put up the first U.S. satellite. They are the group which teamed up with Von Braun in the first satellite. Dr. Von Braun's group did the vehicle; JPL did the spacecraft and the scientific measurements. They are an outstanding group.

To the best of my knowledge, the pay scales are reasonably comparable except for the top echelon, just as in Government.

Mr. THOMAS. We do not object to the salaries; they are worth that and more. You talk of your top people. There is not a finer man than Dr. Pickering. I imagine he could go into industry and get twice the salary. I cannot imagine Dr. Pickering going by at 7:30 and getting his orders for the day from Dr. Dubridge, president of Cal Tech, and then come along at 8:30 and you give him another order.

NATURE OF CONTRACT WITH CAL TECH

Mr. OSTERTAG. Basically, Dr. Dryden, you enter into a contract with Cal Tech.

Dr. DRYDEN. With the California Institute of Technology and the trustees of the university.

Mr. OSTERTAG. A nonprofit corporation?

Dr. DRYDEN. That is correct.

Mr. OSTERTAG. You agree to pay a fee, but are the salary schedules and other items of concern outside of your realm?

Dr. DRYDEN. The contract provides that the contractor will furnish NASA, the contracting officer, its total wage and salary schedules for review in regard to reasonableness. Further, the contractor agrees to furnish monthly a separate report on appointments, promotions, and terminations of all employees over $15,000 per annum. The contractor also furnishes, in advance, information on all intended appointments, promotions or salary increases of any JPL executives at the division chief level or higher.

Mr. OSTERTAG. We on the Defense Subcommittee have labored with this very problem in the Defense Establishment in a much larger scale, of course. I am frank to say to you that while we have no firm conclusion as to what alternatives there might be, it is a disturbing growth and development in the field of Government, which can lead to terrific abuses and circumstances, all of which are not sound fundamentally.

Dr. DRYDEN. This was inherited from the Defense Department. I do not think there are any real abuses there.

Mr. EVINS. That is my point. You inherited these things, but do you have to perpetuate the inheritance or can you use imagination and change? You do not have to be dictated by what the military has done.

Dr. DRYDEN. How can I compare this? It is like a corporation, I suppose, which has bought a going business and decides they do not like it that way. Instead of continuing to run the way they are, it will be run some different way. This can be done over a period of years, but I do not think it can be done right at this moment in the space program.

Mr. EVINS. Is any initial step being taken to effect change or is there just a continuation of the same method?

Dr. DRYDEN. I do not see how you do it gradually. You either decide that hereafter these people are going to be civil service, you cannot order them to work for civil service, you can offer them jobs in the civil service, but you cannot offer only half of them jobs in civil service. It has to be a transition with advance notice, worked out over some time. I personally think at this particular moment it is very difficult to do, as long as the available Government salary scales are less than what JPL is now paying.

RENEWAL OF CONTRACT WITH CAL TECH

Mr. THOMAS. Spell it out to Mr. Evins. You have a contract. How much longer does the contract last?

Mr. SIEPERT. The contract was renewed in negotiations last summer. It is a 3-year contract now running in the first of the 3 years.

Mr. THOMAS. I hope you do not make any more contracts without submitting them to this committee. Not that we do not trust your judgment. We just do not like the setup.

Mr. OSTERTAG. That was a renewal of a contract; was it not?

Mr. SIEPERT. Yes, sir.

Mr. OSTERTAG. How much more money was involved in the last contract as compared with the original?

Mr. SIEPERT. The size of the program for which this contract is written is three to four times the size of what was the amount in the first 2 or 2½ years.

Mr. OSTERTAG. The work involved has increased and, therefore, the contract figures are adjusted accordingly?

Mr. SIEPERT. Yes.

Mr. THOMAS. What was the figure? That was the original question. What was the contract figures for the one you superseded with your recent contract?

Mr. SIEPERT. When we took this labaratory over from the Army, we talked of a NASA program of about $40 million a year. The 1962 program is $145 million and the 1963 program covered by the recently negotiated contract is estimated at $213 million.

Mr. THOMAS. What was the fee that you paid by virtue of your last contract? Your present contract calls for a fee in the neighborhood of $1,200,000 a year. What was your other fee?

Mr. SIEPERT. The fee in the last year under the old contract was $950,000.

NATURE OF CONTRIBUTIONS FROM CAL TECH

Dr. DRYDEN. Do you want to say anything about what this represents in the way of contribution from Cal Tech?

Mr. SIEPERT. I think Dr. Dryden has really covered the basic problem here. The main thing that I think NASA must have in this Laboratory is a creative environment, one in which really competent people will associate themselves with the lunar program. As Dr. Dryden pointed out, it is conceivable, if we had time and started from scratch, to build an organization capable of doing this. I would guess, however, this is at least a 5-year task.

Mr. THOMAS. I do not buy that sob story. You have five or six laboratories you built from scratch. Von Braun was your brains to start with, he knew more about it than everybody in the country put together. He worked there for years, he started it.

Mr. SIEPERT. Von Braun came in the late forties, and he was 8 years preparing the organization we took over, which had 4,200 people in it.

Mr. JONAS. Dr. Pickering does not get a dime of this $1,200,000, and neither does anybody else working in the Laboratory. I asked Dr. Dryden to tell me what we get from Cal Tech for this $1.2 million.

Mr. SIEPERT. The $1.2 million fee goes to Cal Tech.

Mr. JONAS. We understand that.

Mr. SIEPERT. The Jet Propulsion Laboratory.

Mr. JONAS. What do they give us for it?

Mr. SIEPERT. The principal thing that Cal Tech feels they give us for this is the association of Cal Tech in this effort as an eminent academic institution.

Mr. JONAS. What do you think they give us?

Mr. SIEPERT. I think they give us that.

Mr. JONAS. You think it is worth that to be able to say that Cal Tech is running the Laboratory? That is all it amounts to; is it not?

Mr. SIEPERT. I think it is worth something, but how you put it on a balance sheet as goodwill, I cannot say. I would rather discuss that in terms of an alternative.

Mr. THOMAS. I do not want to hear you discuss it. How much business experience have you had outside of government? Who did you work for before you came into government and got all this superknowledge about business, et cetera?

Mr. SIEPERT. The questions were not regarding business. The questions were about an academic institution.

Mr. THOMAS. Are you a scientist, a research man? Are you a research scientist or are you a business brain?

Mr. SIEPERT. My job is not in research. My job is in business management.

Mr. THOMAS. I asked you what business experience did you have before you came to this job.

Mr. SIEPERT. I came directly from college training into the public service, having trained in public administration.

ADDITIONS TO MATERIALS RESEARCH LABORATORIES

Mr. THOMAS. Insert CF6–D1 and D4. This addition to materials research laboratories, $610,000.

(The pages referred to follow:)

ADDITIONS TO MATERIALS RESEARCH LABORATORIES, JET PROPULSION LABORATORY

DESCRIPTION

It is proposed to add an additional 20,000 square feet of laboratory and office space to house additional personnel and to carry out supporting research and advanced development work on materials to be used in space vehicles. Approximately 10,000 square feet will be added by construction of two additional floors on the existing materials research laboratory; another 10,000 square feet will be provided by an addition to the existing materials research processing laboratory.

JUSTIFICATION

Additional facilities are needed to carry on supporting research and advanced development work on spacecraft and space vehicle materials. The performance of present-day vehicles is limited by the lack of knowledge of the properties of materials at very high temperatures. The approach to a solution of these problems will be from the standpoint of metallurgy and ceramics, and also from that of solid state physics. Development and testing of improved materials will be carried out on many types of space vehicle components. These will include rocket nozzles and other propulsion components, fuel tanks, and solid fuel rocket cases, and equipment to operate in the very high vacuum of outer space. Part of the work will be aimed at providing engineering data required to design advanced types of space vehicles. A substantial part of the work planned for the new laboratories will deal with the effects of high vacuum,

radiation, and particles found in space upon materials which may be used for spacecraft.

Research is also planned on materials for electronic applications which will lead toward the development of solid state electronic devices to permit major decreases in weight and increases in the performance of space vehicle electronic devices and instruments.

Cost estimate

A. Land acquisition	-------
B. Site development and utility installations	$30,000
Grading, paving, sidewalks, and landscaping	13,000
Substation	10,000
Utility connections	7,000
C. Facility construction and modifications	525,000
Addition to materials research laboratory (10,000 square feet at $27.50 per square foot)	275,000
Addition to materials research processing laboratory (10,000 square feet at $25 per square foot)	250,000
D. Equipment, instrumentation, and support systems	-------
E. Design and engineering services	55,000
Total estimated cost	610,000

TELECOMMUNICATIONS LABORATORY

Mr. THOMAS. We will take a look at your Telecommunications Laboratory; $2,860,000. Put pages CF 6–E1 and CF 6–E3 in the record.

(The pages referred to follow:)

TELECOMMUNICATIONS LABORATORY, JET PROPULSION LABORATORY

DESCRIPTION

This project proposes the construction of an 82,000-gross-square-foot building to provide approximately 40,000 square feet of laboratory space and 42,000 square feet of office space. The multistory building will have an adjacent ground area available for instrumentation vans to be used in connection with the laboratories located at that level. The building will be completely air conditioned and of a permanent-type steel or concrete construction. The general office and laboratory areas will be designed with special emphasis on high capacity air conditioning for the laboratory areas and with adequate power allowance for certain laboratories with high power requirements.

JUSTIFICATION

The telecommunications laboratory requested in this project will house personnel engaged in the central administration and direction of the deep space instrumentation facilities and in research and advanced development programs in this area. Their work includes the design, installation, and operation of suitable ground tracking and communications facilities required in the lunar and planetary programs. The work is accomplished both through inhouse efforts and by the technical direction of outside contractors.

Facility requirements for telecommunications work include the accessibility of technical trailer and laboratory space; an adequate location for testing antennas with good visibility for long distances; the need for a consolidated location where transmitting work may be done without interference to the work of other activities; and the need for a location where antenna receiving work can be done without electrical interference from surrounding activities.

The proposed new laboratory will allow scattered communications activities throughout the station to be consolidated, will permit substandard buildings to

be vacated and demolished, and will contribute to a reduction in the need for rented trailer facilities and off-laboratory space. The telecommunications laboratory will provide office and laboratory space for approximately 325 employees.

Cost estimate

A. Land acquisition	
B. Site development and utility installations	$135,000
Grading, paving, sidewalks, and landscaping	30,000
Substation	60,000
Utility connections	45,000
C. Facility construction and modifications:	
Building (82,000 square feet at $28 per square foot)	2,290,000
D. Equipment, instrumentation, and support systems	200,000
Radiofrequency screening for laboratories	125,000
Instrumentation	35,000
Laboratory equipment	40,000
E. Design and engineering services	235,000
Total estimated cost	2,860,000

Mr. THOMAS. What is this installation?

Mr. BUCKLEY. This houses personnel engaged in telemetering tracking. They have been scattered in substandard buildings. This brings them together.

Mr. THOMAS. Your big item here is 82,000 square feet of construction at $28 per square foot—82,000 square feet is almost 2 acres of ground.

Mr. WYATT. It is a high-rise building, not all on one floor.

Mr. BUCKLEY. It is reasonably flat ground with room for trailers associated with the telemetering and tracking.

Mr. THOMAS. If you are going to put your other big building where your trailers are will you go down the hill from the trailers and be in that big gully?

Dr. SEAMANS. Item A on the plot plan.

LANGLEY RESEARCH CENTER

Mr. THOMAS. Let us look at Langley. Mr. Reporter, put in the record the table on page CF 7–A1.

(The table referred to follows:)

Langley Research Center

Addition to heating plant	$858,000
Additional equipment for magnetoplasmadynamics research	1,450,000
Additional power supply and improved arc chamber for 10-megawatt arc tunnel	760,000
Environmental research facilities for spacecraft components and materials	997,000
Particle accelerator for simulation of micrometeoroid impact	936,000
Stabilization and control equipment laboratory	1,366,000
Vehicle antenna test facility	1,725,000
Total	8,092,000

Mr. THOMAS. This is one of your older installations. You have seven items here. How many of those do you have already planned now? You have one at Canaveral, one here, one at Ames.

ADDITION TO HEATING PLANT

Put in the record pages CF7–A3 and A–5 on the addition to the heating plant; $858,000.

(The pages referred to follow:)

ADDITION TO HEATING PLANT, LANGLEY RESEARCH CENTER

DESCRIPTION

It is proposed to enlarge the capacity of the existing heating plant located in the west area of the Langley Research Center by the addition of a 105,000-pound-per-hour steam boiler and a new 110-p.s.i. air compressor and dryer. The project includes a 5,000-p.s.i. pressure reducing station, supplied by a new 1-inch, 5,000-p.s.i. airline from the gas dynamics storage field. The equipment will be housed in a new 50- by 60-foot addition to the heating plant building and in adjacent areas in the existing building.

JUSTIFICATION

The central heating plant which supplies steam throughout the west area will soon be inadequate. The present boiler capacity is 108,000 pounds per hour at design temperatures. The steam load has become acute in that the existing connected steam load is now 114,000 pounds per hour. This situation will be intensified when facilities presently underway, such as the dynamics research laboratory and the hypersonic aerothermal dynamics facility, begin to use steam. The requested boiler will provide the needed additional steam capacity for these facilities and will provide some reserve capacity for new construction. In addition, the requested boiler will aid in carrying the load when another boiler is shut down for maintenance.

The heating plant's location at the hub of an underground duct system has led to the building's serving as a control source for compressed air. The demand for compressed air has grown to such an extent that several of the existing systems are inadequate. The 100-p.s.i. air system, which supplies air to all west area buildings, is inadequate during peak demand periods. In the event of a major breakdown of the existing air compressor, research work would be delayed. The proposed air compressor will be a supplement to the existing compressor, supply the needed additional air supply, and will maintain service in the event of a major breakdown of the existing compressor. The demand by several research facilities for air over 2,000 p.s.i. is met by filling bottles with an existing 2,500-p.s.i. compressor. However, this compressor even with booster is inadequate to meet existing research demands. The proposed 5,000-p.s.i. service connection will utilize an existing source to supply the increasing demand in this area for high-pressure air.

The existing heating plant was constructed in 1943, and 10 years later one additional boiler was installed. There is no more space available in the building. The proposed building addition will house the feed water pump, other boiler auxiliaries, and air compressors. Some equipment will be relocated from the existing building in order that the new boiler may be placed alongside existing boilers.

This proposed addition to the heating plant will require about 30 months from the initiation of design to the completion of construction. Design funds have been approved in the amount of $42,500 in the fiscal year 1962 for this project so that a construction contract may be awarded early in the fiscal year 1963. The advanced construction date will reduce the critical heating situation from four heating seasons to three before added boiler capacity is available.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$41,000
C. Facility construction and modifications		605,000
Building alteration (3,000 square feet at $42.60 per square foot)	$144,000	
Boiler	335,000	
Piping revisions	126,000	
D. Equipment, instrumentation, and support systems		212,000
Electrical system	87,000	
Air compressor	125,000	
E. Design and engineering services ($42,500 allocated from fiscal year 1962 funds)		
Total estimated cost		858,000

Mr. THOMAS. Facilities construction and modification, $605,000. You are going to have 3,000 additional feet at $42.60. Why is that so high? What are you going to do with that, a boiler room?

Mr. WYATT. This is a boiler room to handle heavy equipment.

Mr. THOMAS. You have a particle accelerator for simulation of micrometeoroid impact. What does that mean?

Mr. DIXON. This facility will accelerate very small particles, micrometeoroid size, that would simulate the impact of a meteoroid on various types of space structures. This is an accelerator that will accelerate one of these particles up to 60,000 feet a second. We can simulate on the ground how one of these particles will penetrate a structure or piece of metal and various other structural materials applicable to spacecraft that we want to build in the future. We simulate this on the ground, as much as we can, so we know how to design some of these new types of structures.

STABILIZATION AND CONTROL EQUIPMENT LABORATORY

Mr. THOMAS. Look at the Stabilization and Control Equipment Laboratory; $1,366,000. Put CF 7–F1, –F3, and –F4 in the record.

(The pages referred to follow:)

STABILIZATION AND CONTROL EQUIPMENT LABORATORY, LANGLEY RESEARCH CENTER

DESCRIPTION

A stabilization and control equipment research laboratory is proposed for construction consisting of a building with special research facilities and including associated offices and shops. The building will house inertial simulators, special high-pressure air supplies for air bearing inertial simulators, electronic simulation facilities for closed loop integrated systems studies, medium high-vacuum facilities for low torque control system investigation over long time periods, long-throw optical facilities for use with simulators, rate tables and servoed tables for use with rate and integrating rate gyroscopes, equatorial mount tables for gyroscope testing, a time drive mount for use with sun, star, and planet seekers, and a magnetic field control to simulate the fields which may be encountered by a space vehicle.

The stabilization and control equipment laboratory will include a long-throw optical facility for use with the simulation equipment and special provisions for eliminating or avoiding externally induced vibrations. The laboratory building will provide one floor for shop and workrooms over a basement for the long-throw optical facility, with a 40- by 40-foot by 35-foot high simulator room at one end.

JUSTIFICATION

Research investigations in reentry aerodynamics and heating, and trajectory analyses and control studies for lunar and planetary missions require the use of research vehicles and probes which must be accurately and efficiently guided and controlled through a flight-test program.

Research and development which will result in improved reliable equipment for sensing and controlling vehicle position and orientation is urgently needed. Stabilization and control work is at present hampered by the lack of the facility proposed in this project. Present and future work can be grouped into three categories:

(*a*) Research and development activities with respect to specific space flight and reentry projects.

(*b*) Testing and evaluation of contractor furnished guidance and control equipment used in the Langley Center activities.

(*c*) Research and development to provide information and techniques needed to secure acceptable guidance and control systems.

Specific examples of recurring needs in the first two categories are the LITTLE JOE and the SCOUT control system projects. Similar future work on extensions of the SCOUT vehicle and its payload, and on the monitoring of control equipment that might be used in large-scale reentry tests will require even more complex and accurate equipment than was needed in the past. The need for reentry data at lunar return velocities requires that the requested facility be available to check out the precise, complex booster and paylood control equipment systems which will be used.

In addition to vehicle guidance, support work is required in conjunction with conceptual lunar orbit and landing control studies to evaluate and test guidance and control concepts employing optical sensing devices and efficient attitude control techniques. Examples of work in the third category are projects seeking to define the optical characteristics of the earth's horizon, and the development of simple horizon-scanning sensors. Work is underway and will continue using flight research vehicles to provide needed design data which will be directly usable for the lunar reentry maneuvers. The requested simulation facility will allow testing of the sensing devices needed for this work.

The manned planetary flight, rendezvous, and docking programs will require the development and evaluation of sensor concepts for star trackers, map matchers, high-sensitivity accelerometers, sextants, and optical radars. The incorporation of such sensors into attitude control systems will require complete simulation of the overall control loop, including the lags and nonlinearities of the actual control jets used. The requested facility will provide the necessary optical facilities, inertial simulation facilities, special exhaust facilities for special fuel, and supporting instrumentation to allow rapid progress in the development of such systems.

Cost estimate

A. Land acquisition		-------
B. Site development and utility installations		$90,000
C. Facility construction and modifications: Laboratory building (18,600 square feet, at $19.95 per square foot)		371,000
D. Equipment, instrumentation and support systems		875,000
Test apparatus	$300,000	
Instrumentation and read-out equipment	550,000	
Electrical equipment	25,000	
E. Design and enginering services		30,000
Total estimated cost		1,366,000

Mr. THOMAS. Your big item here is your equipment. What about it, Dr. Kelley?

Dr. KELLEY. This is primarily a vibration-free building in an isolated area with a special foundation.

Mr. THOMAS. What do you mean by special foundation? Everything there is a special foundation, a floating foundation.

Dr. KELLEY. This is a double foundation so we can isolate certain sections of the building from vibrations around the base and the road itself.

Mr. THOMAS. You have done a good job on your foundation work down there. You do not have any trouble. Instead of using piling, what do you use—concrete slabs?

Mr. MYERS. It depends on the land. If it is marshy, we sometimes use pilings.

Mr. THOMAS. I though you put most of it on a heavy concrete base.

My MYERS. We have in the last few years.

Mr. THOMAS. It works well, does it not?

Mr. MYERS. Yes, sir.

CONVERSION OF TUNNELS

Mr. EVINS. Before leaving Langley, I note on page 9 of your field installations items 5 is a transonic blowdown tunnel and item 7 is a 22-inch transonic tunnel, both listed as inactive. Is it possible to make any adaptations of these inactive facilities instead of constructing new ones? Can you use some of these idle facilities?

Dr. DRYDEN. We have done a good bit of it.

Mr. MYERS. We have converted most of the older larger tunnels we could use for vacuum chambers and the like. However, these blowdown facilities are relatively small and are not in the range of operation of the need either in our aeronautics program or in the space program. We chose to shut them down rather than try to continue a program.

Mr. EVINS. You have other installations, I suppose.

Mr. MYERS. Yes, sir; we shut down about 17 facilities in the past 3 years in the four research centers.

Mr. EVINS. It seems practical to me to adapt some of these or enlarge them rather than just shut them down and build new ones.

Mr. MYERS. As Dr. Dryden stated, we have modified many of the existing buildings and facilities. We have a whole list of these we could go over with you, if you like.

Mr. EVINS. Thank you.

Mr. THOMAS. How many tunnels do we have down there? Is it 15 or 20?

Mr. MYERS. At Langley?

Mr. THOMAS. Yes.

Mr. MYERS. Yes, sir. I think we have——

Mr. THOMAS. How many at Ames? Do we have 62 altogether?

Mr. MYERS. I do not know the exact total.

Mr. THOMAS. Mr. Evins has raised this question many times. Is there not a way you can convert these tunnels?

Mr. WYATT. Yes, sir. At Lewis, for example, the old altitude wind tunnel is no longer used as a wind tunnel but is used as a very large vacuum facility.

Mr. THOMAS. You are not using over a half dozen of all your tunnels.

Mr. WYATT. I think that figure may be a little low. We have deactivated a large number of specialized tunnels, but we still have——

Mr. THOMAS. We have to consider that these things are still in existence, just like the Army comes out with an M–1 tank, and in

4 years they throw it away and get an M–2. The M–1 is still around. It is money spent. We have to learn to forget it is there, I guess, but I do not see how we can do it when at least 90 percent of them have not the slightest bit of utility. Is that a fair statement?

Mr. WYATT. A lot of these still have utility when you consider that everything we fly in space has to take off through the atmosphere and, therefore, requires aerodynamic characteristic determinations.

Mr. THOMAS. You do not use 90 percent of them.

Dr. DRYDEN. We have deactivated quite a number. That means no personnel assigned to them, they are mothballed.

Mr. THOMAS. It has no utility. It is there, that is all.

Dr. DRYDEN. Part of it has to be written off.

Mr. THOMAS. Part of the development program ought to be charged off. We are not suggesting you tear them down. You might save money in the long run if you did.

Mr. Reporter, before we move to the Lewis Research Center, insert in the record the justification pages and cost tables for the balance of the items we have not specifically taken up under the Langley Center.

(The material referred to follows:)

ADDITIONAL EQUIPMENT FOR MAGNETOPLASMADYNAMICS RESEARCH

DESCRIPTION

The equipment requested in this project is needed to permit investigations with plasma generators and accelerators of larger size and more advanced research capabilities than can be provided with currently available equipment and systems. The following items will be procured and located in existing and converted space in the former gas dynamics laboratory:

(*a*) Electrical energy storage bank of capacitors having low inductance and very fast discharge rate.

(*b*) Specially constructed channel for larger scale direct current, steady-flow plasma accelerator.

(*c*) Plasma source utilizing high-power arc jet.

(*d*) Large superconducting magnet with cryostat for application to plasma accelerators.

(*e*) High-capacity steam-ejector evacuating system for receiving and neutralizing plasma flows with alkali metal seeding elements.

(*f*) High-current direct current transmission line to power arc plasma source (item (*c*)) from existing remote direct current power supply.

(*g*) General laboratory instrumentation including microwave and other electronic and electrical equipment.

JUSTIFICATION

It has become apparent that significant benefits will flow from the application of research results in the sciences of magnetohydrodynamics and plasma physics in future space flight and other technological developments. Many advances have been made at the Langley Center and elsewhere toward understanding the basic plasma phenomena involved in efforts to accelerate plasmas, to extract electrical energy from moving plasmas, and to convert plasma energy to radiofrequency energy. All of these latter efforts are directly applicable to space flight technology and are leading to concepts and advanced ideas that can be applied to plasma propulsion, plasma power generation, and space communication. Much of the research accomplished to date, however, has been qualitative in the sense that the equipment has been too small in scale and the energy levels involved have been too low to permit detailed quantitative study and evaluation of the significant parameters involved and of the effects of variations in these parameters. Although various plasma devices which have been studied appear to offer attractive possibilities for various applications, sufficient quantitative information has not been obtained to permit realistic evaluation. The equipment being requested in this project is aimed primarily at providing facilities for

studying such devices as plasma accelerators and plasma guns on a scale and with power levels sufficiently high to permit the very necessary quantitative understanding of the phenomena involved. The project is a continuation of the work undertaken with fiscal year 1962 funds which is providing the capability for clarifying magnetoplasmadynamics phenomena in a quantitative fashion.

Cost estimate

A. Land acquisition	
B. Site development and utility installations	$340,000
Power transmission line	300,000
Extension of steam line	40,000
C. Facility construction and modifications	645,000
Steam ejector evacuating pump	85,000
Plasma source (arc jet)	160,000
Direct current stead-flow plasma accelerator channel	100,000
Capacitor bank	300,000
D. Equipment, instrumentation, and support systems	465,000
Superconducting magnet and cryostat	250,000
Instrumentation and support equipment	215,000
E. Design and engineering services	
Total estimated cost	1,450,000

ADDITIONAL POWER SUPPLY AND IMPROVED ARC CHAMBER FOR 10-MEGAWATT ARC TUNNEL

DESCRIPTION

It is proposed to increase the capability of the existing 10-megawatt arc tunnel to simulate the reentry conditions experienced by vehicles returning to earth from lunar or planetary missions. The project includes the addition to the electrical power equipment of the arc tunnel of rectifiers and associated auxiliaries which will convert a part of the alternating current power to direct current power; the construction of an improved arc chamber incorporating newest techniques in arc heating of air for generating higher temperature airstreams; and the addition of cooling system components to convert the present open water-cooling system to a closed water-cooling system.

JUSTIFICATION

When space vehicles reenter the earth's atmosphere from lunar or planetary missions, the air immediately adjacent to the vehicle surface will be heated to a temperature of approximately 16,000° F. The flow of heat from this high-temperature air into the vehicle structure creates the exceedingly difficult problem of protecting the vehicle and its occupants against flaming destruction. The potentiality for destruction of the vehicle as if it were a meteor is evident from the fact that all known materials are vaporized at temperatures below 7,200° F.

Structures and materials research on the problems of thermal protection for space vehicles, requires ground-based facilities which can simulate the reentry environment. This means that research facilities must be capable of generating and handling airstreams of 16,000° F. and higher. Various methods of heating airstreams have been used in supersonic research facilities, including combustion of chemical fuels and electrical resistance heating of heat exchangers, but none of these methods are capable of producing the temperatures experienced in reentry. Approximately 3 years ago, a significant breakthrough occurred when methods were developed for using high-intensity electric arcs to heat air to the required temperatures. The Langley Center developed a number of subsonic and supersonic arc jets and a subsonic arc tunnel for performing research on small materials test specimens in airstreams at temperatures up to 11,000° F., the temperature encountered in reentry from near earth orbits. In recognition of the fact that a larger facility was needed for tests of models of reasonable size, a 10,000-kilowatt arc tunnel was provided in the fiscal year 1958 appropriation.

The existing 10-megawatt arc tunnel was designed to produce in the test section the high temperature (11,000° F.) and enthalpies of energy content (8,000 B.t.u. per pound) which simulate the environment experienced by a vehicle on reentry from near-earth orbit at appoximately 25,000 feet per second. However, lunar vehicles such as APOLLO and future planetary vehicles will reenter the earth's atmosphere at 36,000 feet per second, the velocity required to escape from the earth's gravitational field, and higher. To simulate this environment in the test section, the arc chamber must be capable of generating air with temperatures approximately 50 percent higher (16,000° F.) and enthalpies approximately 100 percent higher (18,000 B.t.u. per pound) than its present capability. The most advanced techniques for electric arc heating of air will be applied to achieve these temperatures and enthalpies.

Reentry from space remains one of the most difficult problems of successful manned space flight. Intense effort must be applied to the solution of this problem. The electric arc-heated tunnel is the only adequate experimental method of investigating the reentry problem. The requested improvements in the capabilities of the existing 10-megawatt arc tunnel will provide information of direct and immediate use in the design of manned space vehicles.

Cost estimate

A. Land acquisition		-------
B. Site development and utility installations		$48,000
C. Facility construction and modifications		684,000
Direct current power supply and accessories	$308,000	
Piping	98,000	
Arc chamber and accessories	226,000	
Equipment housing (1,980 square feet at $26.25 per square foot)	52,000	
D. Equipment, instrumentation, and support systems		-------
E. Design and engineering services		28,000
Total estimated cost		760,000

ENVIRONMENTAL RESEARCH FACILITIES FOR SPACECRAFT COMPONENTS AND MATERIALS

DESCRIPTION

A variety of vacuum chambers and accessory equipment will be installed in the existing structures research laboratory to test materials, structural components, and equipment of spacecraft in the simulated environment of space. The vacuum chambers will range in size from 1 cubic foot to approximately 50 cubic feet. All will be capable of minimum pressures below 10^{-6} millimeters of mercury (corresponding to altitudes in excess of 200 miles). Accessory equipment will be provided to simulate ultraviolet radiation and solar thermal radiation, to measure weight loss of materials resulting from evaporation in space vacuum, to apply structural loads (both static and dynamic) to the test specimens, and to measure resulting strains, displacements, and temperatures.

JUSTIFICATION

Materials and structures of space vehicles must reliably withstand a space environment that is drastically different from the earth-surface environment. The nearly complete absence of an atmosphere and atmospheric pressure, the presence of ultraviolet and other solar radiation of high intensity (undiminished by an absorbing atmosphere as for the earth's surface), and other factors degrade to some degree the surface, physical, and thermal properties of materials and threaten their very survival on missions of long duration. While both metallic and nonmetallic materials are affected, nonmetallic materials are expected to be more adversely affected; nonmetallic materials must, however, be more extensively used because of other desirable characteristics. An important example of a nonmetallic material that must not be degraded in the space environment is the ablating material that constitutes the thermal protection system of reentry vehicles.

In the hard vacuum of space some materials evaporate very rapidly, but a significant loss of material during a mission cannot be tolerated. Metals tend to weld on contact in vacuum and the dynamic characteristics of structures may

change as the environment affects the characteristics of components. Ultraviolet and infrared radiation embrittle many plastics; the embrittlement of flexible seals on windows, doors, and hatches of a spacecraft could cause a catastrophic loss of the atmosphere within the vehicle. These and many other problems must be investigated to assure a high degree of reliability in the materials and component parts of spacecraft during flight through space and subsequent reentry, if required.

Degradation of materials in the space environment is time dependent, months or years often being required to detect significant changes. Most of the accomplished space missions have been of relatively short duration, but present plans envision manned flights ranging from 2 weeks for initial lunar exploration to more than a year for the first planetary missions. Orbital space stations and lunar bases must have long lives to be economically feasible. Tests of even longer durations are required to satisfactorily determine the properties of materials required in design.

The research and testing planned for the chambers will consist of the measurement of changes in the surface, physical, thermal, optical, mechanical, and other important properties of materials, structural components, and equipment resulting from long exposure to the simulated space environment, including the single and combined effects of each aspect of that environment. Both test chambers and specimens will be small to provide a large volume of data at low cost.

Only a few vacuum chambers are presently available at the Langley Center for work of this type; consequently, several long duration experiments can completely dominate the program. A substantial number of chambers is required so that single tests can run for the weeks, months, or years required in a program composed of a reasonable total number of experiments. The proposed addition is the first step in the augmentation and consolidation of small-scale vacuum facilities at the Langley Research Center. All but a few of the proposed chambers are commercially available and can be placed in operation without delay. Test results can therefore be available promptly for early application to the space program.

Cost estimate

A. Land acquisition		-------
B. Site development and utility installations		$22,000
C. Facility construction and modifications		-------
D. Equipment, instrumentation, and support systems		945,000
Vacuum equipment	$602,000	
Installation and accessories	157,000	
Cryogenic panels	96,000	
Solar lamps	62,000	
Electrical systems	28,000	
E. Design and engineering services		30,000
Total estimated cost		997,000

PARTICLE ACCELERATOR FOR SIMULATION OF MICROMETEOROID IMPACT

DESCRIPTION

The particle accelerater proposed for construction in this project will consist of three principal components: a high-voltage Van de Graaff machine of 5.5 million volts capacity, an ion beam particle charger and injector, and a detector for counting the particles and measuring their velocity. The principle of operation is that the highly charged particles, when exposed to the large potential difference generated by the Van de Graaff machine, are accelerated to high velocity in an evacuated tube. The particles strike the surface of the test specimen at meteroid velocities. Performance predictions for this apparatus indicate that a velocity of 80,000 feet per second will be attained by highly charged tungsten particles of 1-micron diameter and 30,000 feet per second by 10-micron particles.

The accelerator will be housed in a separate concrete enclosure with adequate thicknesses of concrete to provide shielding of personnel against secondary radiation produced by this equipment.

JUSTIFICATION

The available information on comet and asteroid debris in space clearly indicates that a serious meteoroid impact problem exists for manned space vehicles. The meteoroid impact may result in penetration of the vehicle by the larger particles or it may result in erosion of the surface of the vehicle by the smaller particles which are encountered in great numbers. Considering the specific case of a vehicle of the APOLLO type, the probability is high that several penetrations by meteoroids will be experienced in a lunar mission of 2 weeks. In addition, a sandblast-type erosion will be experienced from the more frequently encountered micrometeoroids. These micrometeoroids might not penetrate the vehicle shell, but their erosive action will obliterate surface treatments which, through ability to reflect or absorb solar heat and radiate internally generated heat, have the very important function of controlling the internal temperature of the space vehicle and making it habitable by men and by instruments. Although this loss of temperature control proceeds slowly, it constitutes a hazard to the success of manned space flight just as much as impacts by penetrating meteoroids.

Existing research facilities for launching high-speed particles are incapable of producing velocities in the range of 30,000 to 250,000 feet per second which are attained by meteoroids. The highest velocities now attained are below the lower limit of meteoroid velocities. No other technique appears capable of developing velocities as high as those which appear feasible with the particle accelerator. The facility proposed in this project is particularly well-suited to the purpose of simulating the most frequently encountered meteoric particles, those with high velocity and density but small mass.

In comparison with the known costs of conducting meteoroid impact research in space by means of satellites, a ground facility of the type proposed is very economical. Because the major component of the facility, the electrostatic accelerator, is a well-developed and readily available piece of equipment, the particle accelerator can be placed in operation within a time period such that significant research can be performed toward the goal of understanding and minimizing the micrometeoroid hazard for manned space vehicles.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installation		$124,000
Electrical distribution	$54,000	
Grading, paving, and mechanical utilities	70,000	
C. Facility construction and modifications		709,000
Accelerator	$452,000	
Auxiliaries for accelerator	142,000	
Shielded accelerator housing and control room (1,148 square feet at $100 per square foot)	115,000	
D. Equipment, instrumentation, and support systems		70,000
E. Design and engineering services		33,000
Total estimated cost		936,000

VEHICLE ANTENNA TEST FACILITY

DESCRIPTION

An antenna test facility is required for use in reentry environment and other flight programs and to serve as a tool for advanced general research and development on antenna systems for vehicles utilizing radio telemetry.

The facility will include two indoor radiofrequency anechoic antenna test chambers, one chamber to be used for antennas utilizing the frequency range between 100 mc 1 kmc and the second for the frequency range 1 kmc to 80 kmc. An antenna assembly area will be provided. A separate screened room will be available as either a mircrowave systems laboratory or as a low noise receiving techniques laboratory. The laboratory building will consist of the test range area having a ceiling height of approximately 35 feet and a one-story wing containing the remaining work area.

JUSTIFICATION

Work is underway on several space flight projects involving the use of multistage launch vehicles and their payloads, and on general long range research and development projects on data transmission techniques utilizing radio telemetry. These projects involve the simultaneous use of several radiofrequency receivers and transmitters which must be provided with noninterfering antenna systems which radiate efficiently to illuminate the ground telemetry and tracking stations. The problem is further aggravated by the fact that the data transmission must continue when the vehicle is immersed in highly ionized gases during reentry. At present, antenna tests are accomplished on an outdoor range under the difficulties imposed by extraneous signals due to reflection from surrounding objects and by environmental radio noise due to nearby equipment. Inclement weather also limits the amount of work that can be done. The more complex antenna systems which are evolving are more critical of noise environment and cannot be satisfactorily tested on the outdoor range. The proposed facility is required so that design, development, and adjustment of new high gain antenna systems can be accomplished effectively and economically to meet the expanding requirements. The screened room, which will be provided as a microwave and low noise receiver techniques laboratory, is required for the development of high sensitivity receiver equipments and for the adjustment of receiver-transmitter units required for antenna testing.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$220,000
Utilities	$190,000	
Grading and paving	30,000	
C. Facility construction and modifications		830,000
Anechoic-shielded chambers	$410,000	
Screened room	30,000	
Laboratory building (14,820 square feet at $26.32 per square foot)	380,000	
D. Equipment, instrumentation, and support systems		645,000
Antenna range instrumentation	$200,000	
Microwave instrumentation	100,000	
Laboratory standards	200,000	
Laboratory test and shop equipment	145,000	
E. Design and engineering services		30,000
Total estimated cost		1,725,000

LEWIS RESEARCH CENTER

Mr. THOMAS. Let us take up the Lewis Research Center. We have six items totaling $43.8 million. Put CF8–A1 in the record.

(The page referred to follows:)

Lewis Research Center

Development engineering building	$4,650,000
Hydrogen heat transfer facility	2,400,000
Lunar propulsion research facility	6,275,000
Modernization and reconditioning of Plum Brook service facilities	1,508,000
Nuclear rocket dynamics and controls facility	3,500,000
Space propulsion facility	25,500,000
Total	43,833,000

SUMMARY OF LEWIS CENTER

Mr. THOMAS. The big money starts in the equipment. Dr. Silverstein went into this, but summarize it for us. Dr. Seamans, will you do that?

Dr. SEAMANS. As Dr. Silverstein indicated when he was here, we have a need for a facility in which we can have a hard vacuum, simulate conditions we will find in space, test propulsion units, and test power generation units. It is in this facility that we will test the SNAP-8 along with the electric propulsion system designed to go with it. If we can test thoroughly on the ground or in facilities of this type, we can reduce costs of our flight programs.

NATURE OF TESTING

Mr. THOMAS. What exactly is he going to test? Spell it out in language we can understand.

Dr. SEAMANS. We will connect together in this chamber, all the pieces of hardware that are going to be flown in an electrically propelled space vehicle. They will all be activated, they will be in an environment that duplicates, as closely as is possible, the actual flight environment.

With this facility we will have an opportunity to try out various combinations of components and heating cycles.

Mr. THOMAS. Is this a metal-testing laboratory? Is it far greater than that?

Dr. SEAMANS. It is fundamentally a facility for testing complete subsystems as well as whole propulsion systems.

Mr. THOMAS. Let us go by fundamentally what the laboratory was set up for and what it has been doing in its long history. It has been one of the great institutions in the field of fuel, power, and propulsion. What is this going to do that has not been done heretofore, that you do not have the equipment to do?

HISTORY OF LABORATORY

Dr. DRYDEN. This laboratory was built for piston engines. About as soon as it was completed, the jet engine was produced. The whole laboratory was rebuilt completely for research on jet engines, within a couple of years of its first founding.

The equipment then consisted of altitude——

Mr. THOMAS. You mean the jet engine was developed in this laboratory?

Dr. DRYDEN. No. The jet engine research in this country was done in this laboratory. The development was done by industry. A very bold decision was made that the field for research was the new propulsion, not the old, that the piston engine could continue to be improved by industry, there was no need for the Government to continue research in that field, and they ought to do research in the new and unknown field.

RESEARCH AND DEVELOPMENT TESTING OF ELECTRIC PROPULSION SYSTEM

This in a sense is the same in the field of electrical propulsion. Just as in the old altitude chamber, you could put in a jet engine, supply it with air at the right pressure and temperature, could apply to its exhaust a pressure corresponding to altitude, and operate this engine under the conditions at altitude, both for research purposes and for actual development testing. This facility enables the same thing to be done for a complete electrical propulsion system, which will have

in it first a nuclear reactor and the rotating machinery to develop electric power from the heat of the reactor, which is the SNAP–8 system.

NUCLEAR ROCKET DYNAMICS AND CONTROLS FACILITY

Mr. THOMAS. Let us tie that in with your E–1 project.
Put that justification in the record, plus the cost sheet.
(The material referred to follows:)

NUCLEAR ROCKET DYNAMICS AND CONTROLS FACILITY, LEWIS RESEARCH CENTER

DESCRIPTION

This project consists of modifications and improvements to the existing altitude rocket test stand (B–1) at the Plum Brook Station to permit continued experimental investigations of a wide range of important research problems concerning the dynamics and control of nuclear rocket propulsion systems. The reactor performance will be simulated by an analog computer acting on inputs from neutron sensors (or other instrumentation) and by controlling valves and other system components. Primary research equipment will be provided by a propellant tank, a turbodrive unit, suitable lines and controls, and by pertinent reactor parts such as a reflector, a pressure shell, a simulated core, and an exhaust nozzle. A gas generator system and heat exchanger system will provide proper drive power for the turbine, thus allowing study of various nuclear engine cycles. Expansion of the existing instrumentation and improvements in the altitude pumping system will also be made.

The facility will require service from a new 50,000-kilovolt-ampere electric power substation included in this project. This improvement in electric power service is required because of the increasing demands of existing and contemplated facilities. In the nuclear rocket program this power improvement will provide appropriate heating of the engine reflector so that a wide range of engine startup dynamics may be investigated. A 138,000-volt transmission line will be constructed by the electric power utility company and terminated at the new substation. The substation will include automatic voltage regulating transformers, switch gear, controls, metering, and protective equipment to provide 34,500-volt electric power for distribution to existing and new facilities at the Plum Brook Station. The existing 34,500-volt distribution system will be modified to obtain maximum reliability and utilization of the overall electric power system.

JUSTIFICATION

All studies of future space propulsion requirements reveal the importance of the nuclear rocket. The studies further indicate that the nuclear rocket must be a highly sophisticated device, capable of operational flexibility, reliability, and sufficient performance versatility to adapt to many missions. The engine must be capable to zero-g starts and restarts, it must be throttleable, able to perform retro or landing manuvers, and capable of powering manned vehicles. Relative to these ultimate objectives, current research facilities, research programs, and hence our current knowledge of engine design and operation are in a very rudimentary state.

To advance the technology of nuclear propulsion will require considerable research in new and expanded facilities. As far as component research is concerned, the Plum Brook rocket systems research facility and the proposed fiscal year 1963 project for a hydrogen heat transfer facility will provide capability for the immediate future. The nuclear rocket engine is, however, a very complex and highly interrelated device wherein the various influences of one compenent or process on all of the others in the engine very strongly dictate both individual component requirements and the basic design, operation, and performance requirements of the total system. Some examples of these overriding and critical research problems are the following:

(*a*) A primary difficulty lies in the adaptation of the propellant feed system to the reactor transient and control requirements. The fluid pumping cycle must be controllable from both a hydrodynamic and a nuclear standpoint to assure quick, safe startup and shutdown transients. Several possible turbodrive cycles (gas generator, bleed, and topping) must be investigated to establish both the suitability of currently envisaged systems to present reactor designs, and a rational basis for a selection of components and pumping systems for future engines. Reactor designs with and without radiation shields will be investigated.

(*b*) The achievement of satisfactory engine startup is a particularly difficult research problem. The transient heat transfer in the reactor, which couples reactor power with reactor flow, produces appreciable thermal lags that have a strong influence on the turbopump and propellant flow acceleration and on the engine control system. These reactor heat transfer kinetics must also be related to reactor nucleonics and to the rest of the system to determine proper gas temperature schedules during startup.

(*c*) Inadvertent injection of liquid hydrogen into the reactor core can cause an uncontrolled increase in reactor power. Sufficient heat capacity must therefore exist in the reflector and engine cooling passages to assure complete vaporization of the liquid hydrogen without instabilities in the flow control. Analyses of these complex processes require experimental investigations of unsteady and discontinuous boiling of liquid hydrogen in the several components of the fluid system and under the flow control of the fluid system.

(*d*) Pressurization of liquid by hydrogen gas—a system of considerable advantage—imposed many problems of control and stability of the pressurization system.

(*e*) Future nuclear rockets will probably utilize multiple pump-turbine combinations. Important research problems concerning the stability of flow and proportioning of loads upon the several turbopumps and on their controls for safe operation are thereby introduced.

(*f*) The off-design operation requirements introduced by throttled, or part-load, power outputs force all of the components into regions of limited performance or unsafe operation depending upon the mutually interacting flow, heat transfer, energy input, and energy extraction characteristics of the various parts of the system.

Most of the above problem areas involve or are closely related to reactor characteristics, both steady state and in transient. To investigate the basic nature and to develop solutions for all of these problems with a complete system that includes a nuclear reactor will, however, be extremely difficult if not impossible. Fortunately, reactor flow impedance and nuclear kinetics can be simulated by analog representations and the reactor effects adequately reproduced in the flow and control system by suitable valves and sensors. What is needed is an improved research facility in which the principal components of a propellent delivery system are coupled to simulated reactors and the many nonnuclear system and control problems experimentally investigated without the large cost, hazard, time, and effort involved with a nuclear environment. The facility modifications and improvements of this proposal will provide this unique and essential research capability.

The present electrical service at the Plum Brook Station consists of two 34,500-volt circuits provided by the electric power utility company. These two circuits are of limited capacity and are just sufficient to serve the existing facilities. In the event of difficulty with either service, or outages for maintenance work, it may be necessary to curtail operations in parts of the Plum Brook site other than the reactor.

The 1963 construction program proposes two new facilities at the Plum Brook Station which have large power requirements, a space propulsion facility, and the nuclear rocket dynamics and controls facility discussed in this project write-up. It is estimated that these two projects will require 10,000 and 20,000 kilovolt-amperes, respectively. The existing electrical services do not have sufficient capacity to supply this additional load. The installation of a new 50,000-kilovolt-ampere substation will provide additional reliability to the power supply for the existing facilities and will add the necessary capacity for the proposed new facilities. The new substation will include a reasonable additional capacity for future loads.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$960,000
34,500-volt power lines	$50,000	
50,000-kilovolt-ampere substation	710,000	
20,000-kilovolt-ampere stepdown substation	200,000	
C. Facility construction and modifications		
D. Equipment, instrumentation, and support systems		2,423,000
Hot gas generator system	$234,000	
Analog computer	295,000	
Steam system	195,000	
Instrumentation	95,000	
Electric heater elements	150,000	
Electric heater control system	700,000	
Propellent system modification and hydrogen Dewar	214,000	
Nozzle for bleed cycle	80,000	
Hydrogen heat exchanger	100,000	
Radiation shield and heated reflector assembly	360,000	
E. Design and engineering services		117,000
Total estimated cost		3,500,000

ELECTRICAL AND THERMAL PROPULSION

Mr. THOMAS. Tie in the SNAP-8 program and this one. What connection do they have?

Dr. DRYDEN. Nuclear rocket, you substitute for combustion the heat generated in the reactor, which heats hydrogen, which is squirted out of an ordinary nozzle. This facility will not have the capability of taking the exhaust from a nuclear rocket and dealing with it. This nuclear rocket test——

Mr. THOMAS. They are two separate and distinct animals?

Dr. DRYDEN. Yes, sir.

Mr. WYATT. There are two ways of using nuclear energy, as we see it now. One is a thermal system where you heat gas, as with a conventional rocket, but you use nuclear heat. The other is to convert the nuclear energy into electricity. The one area of thermal propulsion is represented by the ROVER-type rocket, and the other is the electrical propulsion system.

Mr. THOMAS. What will these two facilities do when you get them completed?

Dr. DRYDEN. This will have the reactor which is to go on a spacecraft, a very much smaller device, which will be flown. What this enables you to do is work on the propulsion systems which will be flown beginning, say, in 1967 for the missions in deep space. This is a way you get the capability to carry on beyond the moon into deeper regions of space.

Electrical propulsion also has some possible applications in taking very heavy satellites and moving them from a low orbit around the earth to a much higher orbit around the earth by spiraling outward using the electrical propulsion systems.

Mr. THOMAS. Is Dr. Silverstein going to come in here next year and want to modernize his atomic reactor? He has already spent $15 or $20 million on that. Is that the basis of your two laboratories here, these two projects?

Dr. DRYDEN. No, sir; that is another facility. You mentioned materials before. One of the main objectives of the nuclear test reactor that is on the site at Plum Brook is the investigation of materials suitable for use in nuclear rockets and nuclear systems.

OBJECTIVES OF SPACE PROPULSION FACILITY

Mr. THOMAS. What is the need of the big item?

Mr. FINGER. We will be developing electric rocket systems jointly with AEC. AEC will develop the reactor, NASA is developing the systems to convert from reactor heat energy to electric output, and the Lewis Research Center is also doing research and monitoring development of electric thrust chambers, the electric energy is used to accelerate propellants out the rear end. We have nowhere in this country a facility in which we can put all these pieces together and test it under simulated space environment.

Mr. THOMAS. That is your big one?

Mr. FINGER. Yes, sir, and that is this facility. This is the first facility in the country which will provide that capability.

ROCKET CONTROL FACILITY

Mr. THOMAS. What about this next one, your nuclear rocket control facility? How does it fit in? Is there any connection there?

Mr. FINGER. No, sir; that is a facility to do research on entirely different kinds of nuclear propulsion, one in which hydrogen is heated in a reactor and expelled in a jet nozzle just as in a chemical system.

USE OF REACTOR

Mr. THOMAS. What is the original reactor that is about to come into operation and which has been building for 6 years? Where does that fit into the picture?

Mr. FINGER. The difference between that reactor and these facilities we are talking about is that one is a permanent stationary research installation with a fixed reactor. We bring samples into the reactor to evaluate the effect of radiation on these materials and rocket components or electric propulsion components. In these facilities we bring hardware that has been developed outside, including reactor parts, into the facilities to investigate the actual flight-type hardware.

The Plum Brook reactor installation is a large stationary permanent research installation, and the reactor is an integral part of it. That facility would mean nothing without the reactor in it, whereas, these are meaningful facilities in themselves.

MODERNIZATION OF PLUM BROOK SERVICE FACILITIES

Mr. THOMAS. What is the nature of this modernization? We will put the justification beginning on D1 in the record.

(The material referred to follows:)

MODERNIZATION AND RECONDITIONING OF PLUM BROOK SERVICE FACILITIES, LEWIS RESEARCH CENTER

DESCRIPTION

The Lewis Research Center is now operating its Plum Brook Station on a site under lease from the U.S. Army Ordnance Department. Arrangements for permanent transfer of the site are underway. On the site are the facilities of the former Plum Brook Ordnance Works built during World War II as an emergency and temporary installation. After the war, operations were suspended and the installation kept in reserve. The reconditioning of a number of structures and service facilities is now required to provide for their safe utilization by NASA personnel.

This project consists of the alteration and reconditioning of a number of existing buildings; the construction of two small additional buildings; the renovation and extension of rail facilities; the decontamination of certain areas and buildings; the demolition of surveyed buildings and process piping lines; and road extensions and improvements.

JUSTIFICATION

The construction of NASA facilities at the Plum Brook Station began in 1955. The NASA capital investment at the station is now approximately $40 million; the additional projects being proposed in this budget will increase this figure to approximately $75 million.

This volume of research facilities must depend for support upon a war-period built facility involving many miles of highway, railroads, underground services, and electrical power services. After more than 20 years of use many of these utility installations are beginning to show volume failures.

To date, NASA activities have mainly involved the construction of facilities for which existing services have not been of critical importance. However, with the completion of many of the facilities now under construction it is a matter of serious concern that services be functional to a high degree of efficiency.

The repair and modernization of utility and service installations must be undertaken promptly. Power failures, breaks in water mains, bad road conditions, and other breakdowns have already caused some delays and postponements in research operations. As more facilities are put into service it can be expected that these interruptions will increase until the protective remedies proposed in this project are completed. The significant improvements being proposed are discussed below:

Buildings

Working space is needed for the additional administrative, service, and research personnel being added to the staff of the Plum Brook Station. Additional space is also needed to house military and contractor personnel participating in research projects being conducted at Plum Brook. No suitable space is available to take care of increased requirements for office space. The reconditioning of an existing administration building will meet these needs.

The hospital building requires renovation. The project includes new floor tile, painting, acoustical ceiling, and lighting for this building. The main fire station also requires renovation. The work to be performed will consist of repairs to the floors and ceiling, and to the lighting, heating, and communications systems.

The combine shop provides space for shipping, receiving, fabrication, maintenance, pipefitting and carpentry services. Repairs will be made to plumbing, drainage, roofing, and electrical systems. Repairs at the garage are required for the water, heating, and lighting facilities, and to the building structure. A new vehicle lift will also be installed. Storage buildings must be renovated to provide space for the storage of stock supplies and equipment. As the use of the facilities at Plum Brook increases it is necessary to provide additional storage capability.

A new main guard house is needed to provide an adequate facility for security purposes and to serve as a control center for communications during emergencies. The cryogenic sanitary cleaning building is required to provide sterile and controlled atmospheric conditions for the cleaning of dewars, tanks, vessels, and engine components. Foreign material in any part of a test installation can result in explosive reactions.

Utility systems

The reconditioning and extension of all major utility systems are needed to provide operational reliability. The reactor requires a reliable source of raw water in large quantities; the water reservoir and pumping facilities must be renovated and extended to insure the required reliability. Improvements to gas and steam distribution lines; to sanitary and storm sewers; and to the electrical and communication systems are required to meet an increasing demand for services and as a matter of good business practice.

Railroad trackage

The renovation and extension of rail facilities will permit the shipment of tank car quantities of helium and liquid hydrogen directly to the user facilities. At present only trailer deliveries can be made. The use of rail facilities will result in lower operating costs and longer uninterrupted test runs, and will help insure that adequate supplies of helium and hydrogen are available to maintain research schedules.

Decontamination, demolition, and removal

The decontamination of several areas is required to utilize the sites for construction purposes. Several underground TNT waste disposal lines must also be decontaminated and removed as they represent a potential hazard for explosion. Buildings which have been surveyed and overhead abandoned process piping and poles represent a hazard to personnel. The project includes their demolition and removal.

Road extension and improvement

The existing roadway network consists of narrow country-type roads constructed of a waterbound base with either a bituminous surface treatment (penetration) or bituminous concrete surface. The road system must now be improved to provide for adequate and safe transportation and for off-road parking facilities for hazardous gases and cryogenic liquids in Dewars and tube trailers. The recommended road improvements will provide the necessary widths, load bearings, and safety features for the transportation of the large Dewars and tube trailers needed by the rocket systems research facilities.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$975,000
Reconditioning and extension of utility systems	$400,000	
Railroad repairs	25,000	
Repair and extension of roads	110,000	
Decontamination and demolition	440,000	
C. Facility construction and modifications		458,000
Reconditioning of administration building	$203,000	
Reconditioning of hospital	8,000	
Reconditioning of main fire station	5,000	
Reconditioning of combine shop	60,000	
Reconditioning of garage	35,000	
Reconditioning of storage buildings	70,000	
New main guard house	12,000	
New cryogenic sanitary cleaning facility	65,000	
H. Equipment, instrumentation, and support systems		
E. Design and engineering services		75,000
Total estimated cost		1,508,000

Mr. THOMAS. Tell us about this modernization.

Dr. DRYDEN. This is more electric power primarily.

Mr. DIXON. This was a T. & T. facility. We wanted to bring them up to date and be able to use the facility more efficiently.

Mr. THOMAS. What are we going to do with them? You have a lot of old buildings where you made gunpowder. What are you going to do with them? He has new installations handling nitrogen and hydrogen. What is he going to do with this?

Mr. DIXON. What we would like to do is to take the buildings that are still usable and put in new partitions and new arrangements in the buildings, which would be better than building new buildings.

Mr. THOMAS. There are three or four of them?

Mr. DIXON. Yes.

Mr. THOMAS. Are you going to make storage space out of them?

Mr. DIXON. No. Our test engineers will be in these buildings. They will work back and forth between the test stands and these buildings.

Dr. SEAMANS. We are establishing Plum Brook as a very important station, part of the Lewis Center. It is at Plum Brook that we will have the facilities that we have been discussing here this morning as well as the reactor that will be in operation in the near future. We must have people permanently out there, technicians and engineers, professional people working in these various facilities. This is a modernization of the station.

Mr. THOMAS. Are you going to keep all that land? How many acres are in it?

Mr. MYERS. Approximately 6,000 acres.

Mr. THOMAS. Has the Army moved out completely?

Mr. WYATT. It is in the process of being transferred to us.

Mr. MYERS. Those buildings that can be used, such as the administration building, are being modernized.

Mr. THOMAS. What are you going to do with the big powerplant?

Mr. MYERS. Actually, there is not enough power for the facilities we are asking for. Within the nuclear rocket facilities here there is a request for a large power installation.

Mr. DIXON. That boilerhouse we will demolish in this coming year. It is of no use in this operation. We plan to modernize the hospital building and the main fire station and the shops and garage and storage building. We would build two small buildings, an entry into the facility, a guardhouse and cryogenic cleaning facility from the test stands, where we need to clean valves and some components prior to putting them on the test stands.

GAS DYNAMIC FACILITIES AT LANGLEY RESEARCH CENTER

Mr. JONAS. Dr. Dryden, do you have anywhere in the system gas dynamics facilities?

Dr. DRYDEN. We have some existing gas dynamic facilities at Langley.

Mr. JONAS. You are not asking for any expansion of that?

Mr. DIXON. No, sir.

Mr. JONAS. What does it consist of? It is not in this book?

Mr. DIXON. We have several blowdown tunnels for gas dynamics where we pump tanks at high pressure and have it blow down through a supersonic nozzle.

Mr. JONAS. What do you do in such facilities?

Mr. DIXON. We study the heating effects and some of the configurations of space vehicles. We simulate certain reentry conditions, how the space vehicle comes in to the earth.

Mr. JONAS. Is that a modern facility?

Mr. DIXON. Yes, sir. We are still using this one.

Mr. JONAS. This is at Langley?

Mr. DIXON. Yes, sir. We have that at Langley.

Mr. JONAS. Did you know the Air Force is asking for $10 million to build one at Wright-Patterson?

Mr. DIXON. Yes, sir.

Mr. JONAS. Have you been in touch with them or has the Air Force been in touch with you?

Dr. KURZWEG. Yes. We knew about these tunnels.

Dr. DRYDEN. There are differences in the technical capabilities, as I recall.

Dr. KURZWEG. That is correct. The gas dynamic facility, of course, is nothing but a wind tunnel for the modern vehicles. That means we have to preheat the air and we have to put higher pressure in. The air changes in character. This is why we call it gas dynamics. We have quite a few of these tunnels available at Ames and at Langley, and also the Navy and the Air Force have them. The Air Force and the Navy have a very big wind tunnel of this height which goes to very high pressures.

Mr. JONAS. How high do you go with your temperatures?

Dr. KURZWEG. We can go in our tunnels to 6,000° or 7,000° in the lower gas dynamic tunnels, but we have other tunnels where we can go even higher. We do not call these gas dynamic tunnels any more.

Mr. JONAS. What is the maximum capacity or the maximum height you can go in degrees?

Dr. KURZWEG. In temperature?

Mr. JONAS. Yes.

Dr. KURZWEG. In these gas dynamic tunnels we cannot go more than 6,000° or 7,000°, but we have other tunnels where we can go higher than that, up to 15,000° or 16,000°. As a matter of fact, we have one item here which makes an improvement to one of the existing tunnels in which we can go up to 18,000°.

Mr. JONAS. I would think the Space Agency would have a higher requirement for a facility of this sort than the Air Force. Why is the Air Force in this?

Dr. DRYDEN. They are associated with the DYNA-SOAR and related projects. I know we have held discussions with them about this facility.

Dr. KURZWEG. If the Air Force has the responsibility for a vehicle of this type which goes to 16,000 or 17,000 miles an hour, then I think they should have one of these tunnels.

Dr. DRYDEN. 16,000 or 17,000 miles per hour in the atmosphere where the heat is very high.

Mr. JONAS. You do not think they could use yours?

Dr. DRYDEN. They do use ours within their limits.

Dr. KURZWEG. Of course, our tunnels of this type will be pretty much occupied—fully occupied.

Mr. JONAS. It strikes me that there is here a field of overlapping and duplication. The Air Force does not have that $10 million, but they are asking for it in this year's program.

Dr. DRYDEN. I think, Mr. Jonas, these facilities are tools. You see two tools that are alike, just as you might see two big presses alike in a manufacturing plant. If it is feasible for a manufacturing plant to have all of its forging done at some remote location, then this makes sense. If there is sufficient work for two factories, then you need two sets of tools. This is the problem. We have not attempted to form

any independent judgment as to the workload which the Air Force has. We have said we will try to make available time in our facilities within their capabilities. As I understand it, this has somewhat greater capabilities, particularly with regard to size. These 18,000° tunnels are relatively small affairs, very tiny models.

Mr. JONAS. That is what they want to build.

Dr. KURZWEG. We intend to go to about a 2-foot test section, but they want to have a larger test section than that.

Mr. JONAS. They do not describe the dimensions of the tunnel. They just say they want to go to about 18,000°.

Dr. KURZWEG. Yes.

Mr. JONAS. That is all, Mr. Chairman.

Dr. KURZWEG. The latest figure I have from the Air Force is about an 8-foot-diameter test section, which is a tremendous tunnel.

Mr. THOMAS. What fuel do you use to get the temperature up to 18,000°?

Dr. KURZWEG. How to do it is still something which has not been solved. It is a very difficult thing to put a tunnel like this in operation. We know approximately how we have to go, in what direction we have to go.

Mr. THOMAS. What would be the thickness of the walls to hold that high temperature?

Dr. KURZWEG. One has to make some special cushions of air and helium.

Dr. DRYDEN. You must not let it heat the wall. You put a sheath of cooler air around it.

Dr. KURZWEG. Either cooler air or helium or something to keep it away from the wall.

Dr. DRYDEN. There is no material that will take that temperature.

Mr. JONAS. That is pretty hot, is it not?

ADDITIONAL PROJECTS FOR LEWIS RESEARCH CENTER

Mr. THOMAS. Mr. Reporter. Before we move to the Manned Spacecraft Center insert in the record the justification and cost estimates on the projects that we did not go into specifically.

(The material referred to follows:)

DEVELOPMENT ENGINEERING BUILDING

DESCRIPTION

The building proposed in this project will provide office space for approximately 1,250 research and engineering personnel, plus service areas for associated mechanical and electrical equipment.

The structure will be of steel frame, masonry, and preformed wall panel exterior, aluminum sash and doors, acoustical ceilings, vinyl tile floors, and prefabricated interior partitions. Services will include hot-water heating and air conditioning, the usual plumbing, electrical and elevator services, and communications systems. Grounds will be landscaped and parking space for approximately 500 cars will be provided.

The building will be located on the north side of Brookpark Road, directly across from the Lewis Center's present entrance. A short roadway, passing under the eastern end of the Brookpark Road Bridge, will connect the new and old areas. The new roadway, plus a relocation of the present entrance road, will also alleviate an existing serious traffic congestion at this point by eliminating all left-hand turns on the highway.

JUSTIFICATION

The proposed development engineering building is needed to house the new employees scheduled to be added to the Lewis Center staff. Space for those reporting during the current fiscal year, and early in the fiscal year 1963, will be provided by altering and enlarging existing buildings. However, the total number of employees anticipated by the end of 1963 cannot be accommodated in existing or presently authorized buildings.

Most of the new employees will be engaged in the management and direction of system development contracts placed with various industrial organizations. At the same time, it is important that they keep in close touch with the latest research and other supporting test programs being conducted in the Lewis Center's own facilities. The site proposed for the new building is admirably situated for both these functions.

Cost estimate

A. Land acquisition		------
B. Site development and utility installations		$787,500
Site preparation	$94,700	
Underpass and access road	200,000	
Entry gate	25,000	
Roads and parking areas	110,000	
Utility extensions and connections	357,000	
C. Facility construction and modifications		3,330,000
Building construction (171,000 square feet at $19.50 per square foot)	$3,330,000	
D. Equipment, instrumentation, and support systems		322,500
Office furniture, firefighting equipment, and auditorium equipment	$322,500	
E. Design and engineering services		210,000
Total estimated cost		4,650,000

HYDROGEN HEAT TRANSFER FACILITY

DESCRIPTION

This facility consists of an inductively heated heat reservoir (pebble bed) and associated fluid storage and flow systems connected to a test section wherein research studies will be conducted. The electric induction heater will heat the pebble bed to a temperature of 5,000° R. over a period of hours with an inert atmosphere present in the bed. By means of a suitable valving arrangement, the bed will then be used to raise the temperature of gaseous hydrogen to about 5,000° R. At a design flow condition of 4½ pounds per second, 1200 p.s.i. and 5,000° R., the length of run will be 2 minutes. Maximum heat-flux levels of 40 B.t.u. per square inch per second, which is comparable to those calculated for nuclear rocket nozzles, will be theoretically attainable in the test section.

This facility will be located at the Plum Brook Station to minimize the complexity of the hydrogen disposal problem. Included in the facility are all safety systems, fuel handling systems, utilities, structures and site improvements that are required.

The facility as originally included in the fiscal year 1962 program was proposed for construction on the site of the Lewis Center at Cleveland, Ohio. The project was temporarily deferred so that other projects of more immediate priority could be built with the available funds. Design studies were continued, however, and the Plum Brook site was determined to be preferable. The main consideration for the Cleveland site was the large connected electrical load required for continuous heating of the hydrogen. Present plans for a pebble-bed heater greatly reduce the load. The new site also provides a better margin of safety because of its remote location. A reduction in the estimated cost of the facility was also possible.

JUSTIFICATION

With the increased use of hydrogen as a propellant in nuclear and thermal rockets, a need for a hot hydrogen facility is evident. Of most immediate interest is the nozzle cooling and heat transfer problem. Exhaust nozzles for nuclear rockets will be required to operate with hydrogen gas heated to temperatures in the range of 5,000° R. The present state of the art does not permit

delineation of the heat transfer and cooling analyses relationships required for the development of optimum flight-type exhaust nozzles.

Research will be conducted on this facility to provide the information necessary for the design and development of satisfactory nuclear rocket nozzles. This research will include basic heat transfer research and development of various types of nozzle cooling systems such as regenerative, ablative, and radiation cooling. Research to evaluate and develop protective and insulating coatings will also be undertaken. Compatibility of materials with hot hydrogen and various problems of fluid mechanics can also be studied.

Full-scale research on nuclear rocket nozzles would be desirable, but the cost would be prohibitive and a suitable test facility would be extremely complex. The proposed facility will permit scale model evaluation of a majority of the heat transfer and cooling problems. The facility will not be limited to applications for the nuclear rocket but will also provide a wide range of capability for fundamental high temperature studies related to electrical propulsion systems and materials.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$205,000
Clearing, filling, grading, and paving	$37,250	
Electrical power extension and substation	129,000	
Sewage treatment plant	2,000	
Utility extensions and connections	36,750	
C. Facility construction and modifications		251,550
Test building and shop; explosion proof (1,100 square feet of high bay area plus 1,750 square feet of low bay area; 2,850 square feet at $63 per square foot)	$179,550	
Addition to control room at existing altitude rocket test stand; pill box construction (1,600 square feet at $45 per square foot)	72,000	
D. Equipment, instrumentation, and support systems		1,747,450
Heater, including pebble bed and induction heater	$865,000	
Hydrogen dewars, trailers, and piping systems	445,000	
Electrical controls and instrumentation	223,000	
Test section and support systems	195,000	
Crane	19,450	
E. Design and engineering services		196,000
Total estimated cost		2,400,000

LUNAR PROPULSION RESEARCH FACILITY

DESCRIPTION

This project proposes the construction of test facilities for conducting altitude performance evaluations necessary to the development of the propulsion system for the lunar landing stage of the APOLLO vehicle.

The facility will consist of a vertical firing test stand at the Plum Brook Station similar to but larger than the present altitude facility (B–1). The new facility will be located about 2,000 feet from the present stand and will be large enough to provide sufficient work area around a test chamber approximately 30 feet in diameter by 35 feet high. A test chamber of this size should be large enough to contain both the engine and fuel tanks of this stage. The facility wil be designed for testing hydrogen-oxygen engines of appropriate chamber pressures and expansion ratios, up to 60,000 pounds thrust under gimbaling and various part-thrust operating conditions.

A jacket around the engine and fuel tanks will be cooled with liquid nitrogen to obtain a low temperature environment. Low pressures in the test chamber will be obtained by using a diffuser on the rocket engine exhaust in addition to a multistage steam ejector system. The steam boilers associated with the present stand will supply the high pressure steam for the new facility. The steam will be piped to accumulators located at the new site. A new steam ejector system and spray coolers will also be installed. The circulating water system at the existing stand will be increased by adding additional pumps. The water supply and return lines will be extended to the new site.

JUSTIFICATION

A manned lunar landing mission will require engines with the ability to start instantly upon receipt of the demand for thrust and with control characteristics and response rates which are compatible with landing trajectory requirements. Such engines will use high energy propellants and will be required to start under the very low temperature and pressure conditions existing in space. It will be necessary to study the ignition characteristics and the starting and stopping transients and to develop an ignition system which will give reliable starts under low pressures and after being exposed to very low temperatures for a long time. The guidance and control systems will so require the development of engines in which the thrust can be varied over a wide range to insure soft landings and control of the touchdown point.

The successful accomplishment of the manned lunar mission will ultimately depend upon how well the individual components have been integrated into a reliable propulsion system. It is therefore necessary that the many components, including fuel tankage, propellant delivery system, rocket engines, and controls, be designed so that they operate free from undesirable interactions and as an effective and reliable entirety. Only by testing these components functioning as portions of the complete system can their interactions be accurately determined and a reliable, trouble-free system of adequate performance be developed.

The facility proposed in this project will provide a sufficient simulation of the space conditions to permit the satisfactory development of the lunar landing propulsion system and for the qualification testing of the flight hardware. By the use of significant portions of the existing altitude facility, the construction of the new facility can be accomplished with important savings in cost and on a schedule which will be compatible with the APOLLO program requirements.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$240,000
Site development	$170,000	
Utility connections	70,000	
C. Facility construction and modifications		1,352,000
Test stand structure; 3 floors (15,200 square feet at $80 per square foot)	$1,216,000	
Pump house addition at existing altitude rocket test stand (3,200 square feet at $20 per square foot)	64,000	
Control room addition at existing altitude rocket test stand (1,600 square feet at $45 per square foot)	72,000	
D. Equipment, instrumentation, and support systems		4,078,000
Exhaust system coolers	$486,000	
Exhaust system piping, heaters, and expansion joints	954,000	
Water system	572,000	
Propellant system	505,000	
Steam system accumulators	700,000	
Steam system piping, valves, and insulation	375,000	
Instrumentation and electrical equipment	486,000	
E. Design and engineering services		605,000
Total estimated cost		6,275,000

SPACE PROPULSION FACILITY

DESCRIPTION

The unique capabilities of the proposed space environment facility will permit the evaluation and development testing of complete advanced power generation and electric propulsion systems. Startup, power change and shutdown transients, system control, and component interactions will be determined. The components of these systems will include a flight-type nuclear reactor, turboelectric power generation systems, radiator or condenser with associated heat exchangers, pumping and control equipment, and electrostatic or electromagnetic rocket engines.

One end of the facility will house an operating nuclear reactor and will be heavily shielded to protect the adjacent chamber and surrounding area from radiation. Separating the two areas will be either a flight-weight shadow shield for control system and transient investigations or a fully protective shield for endurance studies. The two chambers will have independent pumping systems to avoid contamination of the large tank in case of failure of any of the radioactive components.

Integral with the nuclear reactor chamber will be a heavily shielded maintenance, assembly, and disassembly area which will have provision to service the power generation unit as well as the reactor. Remotely operated mechanical hands and tools will be provided for model repair or complete disassembly and encapsulation following completion of an investigation. This provision in relation to existing environmental chambers gives the facility its uniqueness.

The nonnuclear portion of the chamber will be constructed of stainless steel and will be capable of maintaining at least 10^{-6} mm Hg pressure. The walls will be cooled by modular type baffles to temperatures ranging from 70° F. to −320° F. as required. Cryo-pumping of the electric rocket exhaust will be accomplished with liquid nitrogen baffles (−320° F.), and local areas will be cryo-pumped with gaseous helium to −450° F.

The building to house the facility will be approximately 100 by 350 feet and will extend about 60 feet above grade level. The building will contain the space environment chamber, the pumping and power supplies area, a shop and model assembly area, a control room, and the hot disassembly area. A water cooling tower and nitrogen storage tanks will be located adjacent to the facility building. A two-story office building will be attached to one end of the larger building. The facility will be located at the Lewis Research Center's Plum Brook station.

The facility design will include the versatility required for adding in the future a radiant heat source, made of quartz tubes and/or an arc source to simulate the magnitude and spectrum of solar radiation. Further, capacity for lunar, earth, or other planetary albedo simulation will also be incorporated into the design. In conjunction with the modular baffles, such an installation would permit the simultaneous study of extremes of hot and cold on two sides of the vehicle in space.

JUSTIFICATION

This Nation's advanced propulsion and power generation units currently under construction or in the design stage must be capable of executing complex modes of operation with assurance of complete reliability after exposure to space environment for extended periods of time. The proposed facility will be unique in that it will be capable of investigating a complete operating nuclear system. The facility is essential to the successful accomplishment of advanced space programs. It will: (1) reduce the time required for development and evaluation to a small fraction of that required by flight testing alone; (2) allow direct observation of the operating system and enable more detailed measurements to be made compared to a flight program; and (3) greatly enhance the delineation and solution of problem areas for the various components of the system from both performance and reliability aspects. To illustrate, the Snap–8 power generation system cannot be successfully developed by flight testing alone. The components of this system, the nuclear reactor heat source, the primary and secondary heat transfer loops, the liquid metal pumps, the liquid metal turbine, and the condensing radiator must all operate compatibly in a space environment not only during steady state conditions but during all the transient operations each component performs during system startup. A malfunction of any of the sequence of operations involved in each component during startup negates a whole flight test. As has been demonstrated repeatedly in past project development programs, ground based facilities are essential; the cost saved in time and money by eliminating a single failure in the flight program may more than repay the cost of the entire facility.

Althought the various components, such as the nuclear reactor, boiler, radiator, and accelerator, which make up a complete operating nuclear system will be investigated as components, no other facility will be capable of investigating the interactions of the various components on each other. These interactions can seriously affect the system performance, dynamic control characteristics and operational startup and shutdown procedures. For example, the dynamic characteristics of the reactor startup (which may have to be accomplished in flight for the actual vehicle) must be matched to the introduction, pumping, and control

of the liquid metal heat transfer working fluid. The primary fluid in turn affects the heat exchanger and the method and control of startup of the secondary loop liquid metal fluid. Power level changes or shutdown transients affect all components to degrees that can only be crudely estimated until the actual operation.

The facility must be available to accomplish the development of both the Snap-8 power generation system and the electric propulsion system based on this unit. Construction of the proposed facility should therefore be started early in the fiscal year 1963. Engineering and design funds for those portions of the facility which must be planned first have therefore been allocated in the fiscal year 1962.

During and after completion of the development of propulsion systems on the Snap–8 level, the proposed facility will be used for more advanced systems, at ion beam power levels greater than the Snap–8 capabilities, and for work on major components of the more powerful systems that will be needed for manned interplanetary vehicles.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$2,027,000
Site development	$761,000	
New roads and repair of existing roads	401,000	
Railroad spur to site	75,000	
Drainage, open and underground	211,000	
Demolition, cleanup, grading and filling	65,000	
Walks and landscaping	9,000	
Electrical installations	800,000	
34,500-volt power supply	110,000	
Stepdown substation	70,000	
Low-voltage transformers, switch-gear, and power distribution	520,000	
Control and metering systems	20,000	
Telephone and communication systems	80,000	
Water, sewer, and gas: installations	420,000	
Water tower	125,000	
Water lines	75,000	
Gas lines	65,000	
Sewers	155,000	
Steam distribution system	46,000	
C. Facility construction and modifications		7,109,000
Space propulsion facility (main structure)	$5,563,000	
Maintenance, assembly, and disassembly area: 210 by 160 ft. (21,000 sq. ft. at $190 per square foot)	3,990,000	
Operations and shop area; 110 by 260 ft. (28,600 sq. ft. at $55 per square foot)	1,573,000	
Nuclear shield and load supports	900,000	
Office and control building	530,000	
Office area; 30 by 200 ft.; 2 stories plus half basement (15,000 sq. ft. at $22 per square foot)	330,000	
Control area; 50 by 50 ft.; 1 floor plus basement (5,000 sq. ft. at $40 per square foot)	200,000	
Security and monitor building; 40 by 50 ft.; 1 floor (2,000 sq. ft. at $18 per square foot)	36,000	
Heating plant	80,000	
Building; 40 by 40 ft. (1,600 sq. ft. at $15 per square foot)	24,000	
Boilers	56,000	

Cost estimate—Continued

D. Equipment, instrumentation, and support systems		$14,239,000
Cryogenic and other cooling systems	$4,370,000	
Electric engine propellant condensing system utilizing liquid nitrogen (approximately 80,000 sq. ft. at $29 per square foot)	2,320,000	
Ion engine water-cooled target system, including water tower	600,000	
Heat rejection system for snap-type condenser	700,000	
Space temperature environment system for payloads	750,000	
Vacuum tanks	4,000,000	
Space simulation chamber; 50 ft. in diameter by 150 ft. long (830 tons at $4,200 per ton)	3,500,000	
Special hatches, flanges, and vacuum pump nozzles	260,000	
Chamber for reactor and power conversion unit; 18 ft. in diameter and 22 ft. long (60 tons at $4,000 per ton)	240,000	
Pumping systems	2,400,000	
Cryogenic pumps, controls, piping, and filters for reactor area	1,100,000	
Cryogenic pumps for electric engine exhaust, nonnuclear area	800,000	
Helium pumps	500,000	
Instrumentation and controls	1,400,000	
Data acquisition instrumentation	500,000	
Control systems and programers	600,000	
Consoles, recorders, and digitizers	300,000	
Water treatment system	475,000	
Safety and radioactivity monitoring equipment	169,000	
Cranes	175,500	
Special foundations for equipment	150,000	
Decontamination equipment	33,500	
Mechanized entry doors	300,000	
Slavemasters and manipulators	616,000	
Special tools for shop in hot area	150,000	
E. Design and engineering services (an additional $175,000 has been allocated from fiscal year 1962 funds)		2,125,000
Total estimated cost		25,500,000

Manned Spacecraft Center

Mr. Thomas. We shall put page CF9–A1 in the record, "Manned Spacecraft Center." We have "Flight acceleration facility," $10.6 million; "Thermochemical test facilities," $6 million; "Lunar landing simulation facility," $6.5 million; "Site development and utility installations," $7.6 million; for a total of $30,755,000.

(The page referred to follows:)

Manned Spacecraft Center

Flight acceleration facility	$10,630,000
Thermochemical test facilities	6,000,000
Lunar landing simulation facility	6,500,000
Site development and utility installations	7,625,000
Total	30,755,000

FLIGHT ACCELERATION FACILITY

Mr. THOMAS. Let us take a look at the first item on page CF9–A3. Let us put A3, 4, 6, and 7, in the record.

(The pages referred to follow:)

FLIGHT ACCELERATION FACILITY, MANNED SPACECRAFT CENTER

DESCRIPTION

The construction of a large, high g centrifuge is required to accomplish the following purposes:

(*a*) Provide an environmentally controlled dynamic simulator which will be used by astronauts for training and experience in the mechanics of space flight.

(*b*) Provide a dynamic laboratory for the study of psychophysiological factors in the performance of individuals to develop, evaluate, and perfect man-machine subsystems, and to determine human tolerance to specific acceleration profiles.

The facility to accomplish these objectives will require the following characteristics:

(*a*) Forty g acceleration at the rate of 15 g's per second.

(*b*) Three degrees of rotational freedom: pitch, 360°; yaw, 360°; roll, plus or minus 180°.

(*c*) Five rapidly interchangeable gondolas with provisions for control of temperature, humidity, atmosphere pressure, light, and sound.

(*d*) Ability to simulate complex flight and acceleration profiles through programmed control of gondola motion and instrument presentation.

(*e*) Instrumentation and channels for data acquisition, transmission, readout, and recording.

The dynamic simulator will consist of a gondola mounted on the end of a rotating arm which will be activated by a prime mover system. The two-way flow of data will travel through a complex cable system between the control center and the gondola. The arm length will be approximately 100 feet, with the final length to be determined by such factors as gondola size, maximum acceleration gradient along the thrust axis of the gondola, and cost.

The centrifuge will be located within a reinforced concrete pit of approximately 42,000 square feet which will be surmounted by a hemispheric dome which will minimize airflow and thus provide greater control over the rotating device. The entire unit will be operated from an adjacent operations center which will overlook the centrifuge pit. The center will also house preflight and postflight examination laboratories; instrumentation shops for development, assembly, and repair of data acquisition and mensuration systems; a preparation area for larger components; systems engineering space; and an operations area. The project includes a training and administrative building to house computers for programing and data reduction; an assembly and shop building for maintenance, assembly, and storage of gondolas and large components, and a generator room.

The entire facility will possess maximum flexibility in order to permit the use of newly developed gondolas, additional instrumentation, and increased training requirements.

JUSTIFICATION

Training and maintaining the proficiency of an astronaut requires a three-pronged program which includes classroom instruction, simulator training, and actual flight in space trainers. The program must be completely interrelated and integrated. For example, before actual flight, a simulator is necessary for familiarization and preflight training. Following and between flights, the simulator is essential to maintain proficiency and to gain additional experience. The centrifuge will be used to simulate a large number of variables and conditions which will be encountered in actual flight and thus reduce the danger and the cost of actual flights.

The foregoing functions will occupy about 50 percent of the centrifuge time. The remainder will be devoted to performance and physiological studies in the following areas:

(*a*) Integration of the human work function with design of the working space.

(*b*) Development and evaluation of restraints for support systems.

(*c*) Development and evaluation of protective devices.

(*d*) Evaluation of specific critical mechanical systems and subsystems suspected of being sensitive to radial acceleration gradients.

(*e*) Basic biophysical research involving human tolerance to specific acceleration profiles.

Centrifuges are acquiring general use in such areas as propulsion component testing and inertial guidance system evaluation, and each facility is normally designed for a specific purpose. Consequently, there are no devices available with the capability or the available time for training astronauts and for performing the functions discussed above. Of special significance however, is the fact that the training of astronauts must be regarded as a highly integrated function which requires several facilities such as a lunar landing simulation facility, environmental chambers, static simulators, and dynamic simulators. These facilities will form an integrated system available for mission exercises which are realistic and thus yield maximum training for the astronauts.

Cost estimates

A. Land acquisition		
B. Site development and utility installations		$215,000
Water lines	$10,000	
Sanitary and storm sewer lines	10,000	
Electric power and communications connections	140,000	
Roads	45,000	
Clearing and grading	10,000	
C. Facility construction and modifications		3,228,000
Centrifuge facility foundations and substructure (42,000 square feet at $40 per square foot)	$1,680,000	
Centrifuge enclosure (42,000 square feet at $20 per square foot)	840,000	
Control room annex (18,000 square feet at $20 per square foot)	360,000	
Administrative and training building (9,600 square feet at $16 per square foot	154,000	
Shop and assembly building (7,500 square feet at $20.50 per square foot)	154,000	
Generator room (2,000 square feet at $20 per square foot)	40,000	
D. Equipment, instrumentation and support systems		6,057,000
Variable speed converters	$1,200,000	
Drive motor	600,000	
Centrifuge and arm gimbals	2,685,000	
Gondolas	300,000	
Centrifuge control equipment	575,000	
Instrumentation including data acquisition, readout, recording, and cabling	455,000	
Support systems, equipment, and fixtures	242,000	
E. Design and engineering services		1,130,000
Total estimated cost		10,630,000

NATURE OF FLIGHT ACCELERATION FACILITY

Mr. THOMAS. Tell us what this is.

Mr. HOLMES. This is a centrifuge for subjecting both the astronauts in their training as well as the equipment we will be using in the APOLLO mission to the accelerations which will be experienced in space flight. To my mind, it is a very basic and necessary capability to be provided to the Manned Spacecraft Center if they are to carry out their research and development of spacecraft and the training of the astronauts for the program which lies ahead.

It will be a flexible centrifuge in that it will allow, right there where the basic development work is being done, the interchanging of the environment and the support equipment located at the end of the moving arm or centrifuge. With fair rapidity you can change it from an acceleration test setup for personnel to one which will test parts of subsystems and whole systems for the APOLLO.

Mr. THOMAS. Your equipment is $6 million and you have some construction in here; 42,000 square feet at $40 a square foot, three at $20 a square foot, then another at $16, another at $20.50.

What type of construction will this be at $40 a square foot? Is this the concrete?

Mr. HOLMES. The $40 contains the basic foundation to carry these large masses in motion.

Dr. SEAMANS. There can be very large dynamic forces when the centrifuge is in operation. This requires a very heavy construction for support.

THERMOCHEMICAL TEST FACILITIES

Mr. THOMAS. Put in the record pages CF9–B1 and 2, and also B7, 8, and 9.

(The pages referred to follow:)

THERMOCHEMICAL TEST FACILITIES, MANNED SPACECRAFT CENTER

DESCRIPTION

Thermochemical test facilities are required for the evaluation and development of active spacecraft subsystems such as propulsion systems, reaction and attitude control systems, auxiliary power systems, and thermal control systems. The project includes the following facilities:

(*a*) A high thrust propulsion test cell capable of supporting tests of liquid propulsion engines.

(*b*) A high thrust propulsion test cell capable of supporting tests of solid propulsion engines.

(*c*) A hydrogen component cryogenic test cell capable of supporting tests on specific components of larger propulsion engines.

(*d*) An oxidizer component cryogenic test cell capable of supporting tests on specific components of larger propulsion engines.

(*e*) A reaction control facility capable of supporting tests on reaction control systems to 150 pounds thrust.

(*f*) A control room complex for remote operation of hazardous tests.

(*g*) A power systems test facility capable of supporting tests on chemical auxiliary power systems.

(*h*) A thermochemical systems laboratory capable of supporting tests on static energy conversion systems, and offering component capability relative to thermal control systems and reaction control systems. Office space is provided in this building for supervisory and working groups associated with the entire thermochemical area.

(*i*) A thermal control facility capable of supporting heat transfer and heat rejection tests of spacecraft subsystems. The basic component of this facility is a 25-foot diameter thermal vacuum chamber to be operated at 10^{-5} millimeters of mercury. The facility will accommodate APOLLO size service modules.

(*j*) An attitude control facility capable of evaluating certain spacecraft dynamic responses related to the operation of active reaction control jets. A single axis air-bearing table is utilized in this facility.

JUSTIFICATION

The various test facilities requested in this project are required for the development of the APOLLO and other manned spacecraft. The facilities will permit developmental tests for the evaluation of all types of flight hardware. They will be used to conduct many of the timeconsuming and repetitive environmental, evaluation, and qualification tests required for the establishment of design and component reliability. Current designs of components will be tested and evaluated to assure that the proper spacecraft criteria have been met; advanced designs will be tested to develop a readily available inhouse knowledge and capability for use on all spacecraft flight systems. Integrated flight systems will be tested for the purpose of determining the interactions and the dynamics associated with such integrations.

Specific justifications for each individual facility or groups of facilities follow:

(*a*) *Propulson and component test cells.*—Capability is required to allow investigation of the various propulsion systems applicable to manned space flight which will include systems using propellants of high impulse or advanced propulsion systems more suited to the peculiar environments of manned space flight. The facilities will permit test programs to be completed rapidly in accordance with program schedules. The launch escape rocket which generates over 250,000 pounds of thrust is a typical example of a component which will be tested in the 300,000 pound thrust test cell. Tests on the bare motor and tests integrated with associated components will be conducted.

(*b*) *Control complex.*—The control complex will integrate the propulsion test cells and the component test cells. The complex will allow remote and safe control of all tests involving high energy releases or inherent hazards.

(*c*) *Reaction control facility.*—A considerable effort will be required in the development of reaction control systems involving low thrust devices and fast response modulating controls. Investigations of restart capabilities, environmental effects, and overall systems response must be made. Separate investigations of thrust chamber and injector geometries will be required.

(*d*) *Power systems test facility.*—Space power systems involve a complexity of new concepts which must be developed to assure reliable systems. The auxiliary power systems will vary for manned space flight according to mission goals and duration. All concepts of space power including chemical, solar, and nuclear will be ultimately utilized. The power systems test facility will permit testing of electrochemical and chemical-dynamic systems in a protected test cell. Other capabilities such as solar and static devices are provided in the thermochemical laboratory adajcent to this facility.

(*e*) *Thermochemical systems laboratory.*—This facility is required for work on the nonhazardous components involved in energy conversion systems, reaction control systems, and thermal control systems. The laboratory will also be the focal point of personnel assigned to the entire thermochemical area. The laboratory will include a clean room for close tolerance and dust-free assembly requirements.

(*f*) *Thermal control facility.*—The thermal control facility is required for radiator evaluation under simulated environmental conditions. It will be located in a controlled area to allow for the operation of auxiliary power systems requiring the use of cryogenic reactants. A realistic simulation of the extreme variation in the effective space temperature must be imposed on the radiators to fully evaluate system performance for all mission phases.

(*g*) *Attitude control facility.*—In the simulation of factors influencing the spacecraft dynamic response to the attitude control system, the simulation of the reaction control jets cannot be accurately duplicated. The total impulse of the jets is sensitive to the start up and tail off characteristics as well as to combustion efficiencies. It is, therefore, necessary to use an active reaction control system coupled with realistic vehicle inertias.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$195,000
Utility connections	$55,000	
Paving	100,000	
Pads	40,000	
C. Facility construction and modifications		1,448,000
Propulsion and component test cells (2,400 square feet, at $52.30 per square foot)	$502,000	
Control complex (2,880 square feet, at $45 per square foot)	128,000	
Reaction control facility (2,400 square feet, at $49 per square foot)	116,000	
Power systems test facility (2,400 square feet, at $49 per square foot)	116,000	
Thermochemical systems laboratory (7,200 square feet, at $17 per square foot)	124,000	
Thermal control facility (10,000 square feet, at $35 per square foot)	350,000	
Attitude control facility (3,600 square feet, at $31 per square foot)	112,000	
D. Equipment, instrumentation, and support systems		3,697,000
Propulsion and component test cells	$1,228,000	
Cranes and tracking equipment	35,000	
Thrust stands	350,000	
Mechanical and electrical support systems	628,000	
Instrumentation	215,000	
Control complex	107,000	
Mechanical and electrical support systems	27,000	
Instrumentation	80,000	
Reaction control facility	201,000	
Cranes and tracking equipment	5,000	
Thrust stands	50,000	
Mechanical and electrical support systems	131,000	
Instrumentation	15,000	
Power systems test facility	44,000	
Mechanical and electrical support systems	27,000	
Instrumentation	17,000	
Thermochemical systems laboratory	185,000	
Optical and solar devices	120,000	
Mechanical and electrical support systems	35,000	
Instrumentation	30,000	
Thermal control facility	1,725,000	
Cranes and tracking equipment	30,000	
Mechanical and electrical support systems	220,000	
Thermal vacuum chamber	1,435,000	
Instrumentation	40,000	
Attitude control facility	207,000	
Cranes and tracking equipment	5,000	
Mechanical and electrical support systems	52,000	
Instrumentation	150,000	
E. Design and engineering services		660,000
Total estimated cost		6,000,000

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Mr. THOMAS. What is this?

Mr. HOLMES. This provides a test area for thermochemical tests. It is separate from the central facility—by "separate" I mean some spacing, still in that area of land. It will be used for the test of reaction control systems, test of escape rockets, and various thrusters and propulsion units. Most of them are of much smaller size than we consider when we are talking about our large boosters, but which are a necessary and fundamental part of the spacecraft development. It is in this area that these items will be tested.

Mr. THOMAS. The big item of cost shown is for equipment, $3,697,000.

Mr. HOLMES. Yes.

Mr. THOMAS. How firm are these figures?

Mr. HOLMES. I think there are good engineering estimates of what the cost will be. On the other hand, the total engineering design has not been done, so I could not say they are as good as if we had drawings completed for all these.

Mr. THOMAS. You have $660,000 set aside for design and engineering services.

Mr. HOLMES. Yes.

Mr. THOMAS. Does this cover the Corps of Engineers' costs, too?

Mr. HOLMES. Yes.

Mr. THOMAS. Is this a wrap-up cost, or is this the downpayment cost?

Mr. HOLMES. This is the wrap-up cost. On each one of these four items, it is wrap-up cost for the specific items.

LUNAR LANDING SIMULATION FACILITY

Mr. THOMAS. Let us look at page CF9–C1 and 2, and also C–6 and 7, which we will put in the record at this point.

(The pages referred to follow:)

LUNAR LANDING SIMULATION FACILITY, MANNED SPACECRAFT CENTER

DESCRIPTION

The purpose of this project is to provide a facility capable of simulating spacecraft response with lunar gravitational environments. The facility will be used to investigate problems, to develop techniques, to develop equipment, and to train crews in the following areas:

(*a*) Lunar landing.
(*b*) Staging mechanics.
(*c*) Lunar launch.
(*d*) Flight separation of modules during an unplanned mission termination,
(*e*) Spacecraft docking.
(*f*) Transferring crews and cargo from one module to another.

The main facility will consist of a test chamber which will allow free or tethered flight within a closed volume approximately 400 feet long, 150 feet wide, and 210 feet high. Two independent carriages will be provided each of which will have a servocontrolled vertical tethering capability. One carriege will carry live loads up to about 75,000 pounds; the second will be limited to 25,000 pounds. The servocontrol vertical tethering system will support test vehicles in simulation of the differing gravitational fields to be encountered, and will act as a safety device for normally free flight operations. A test vehicle will be provided which may be flown in either a free or a tethered state. The vehicle will incorporate the more essential features of a proposed lunar landing

craft (propulsion, interfaces, visibility) which are necessary for realistic simulation. General hoist, transport, and drop test capabilities will also be included. An integral adjunct to the test chamber is the control building which will contain the equipment to operate and control the carriages and test vehicles.

A specimen preparation and maintenance shop will also be required. This building will provide 15,000 square feet of space with a clear height of 75 feet. An overhead crane with a 75,000-pound live-load capacity is included. A small administration building will provide space for engineering personnel, crew preparation areas, and general office and briefing room space.

In addition to the buildings and structures, a paved free flight test area will be required of approximately the same layout as the chamber; roads, streets, and an isolated fueling and purging area will complete the complex.

From an operational viewpoint the facility will possess a broad capability for the simulation of particular phases of manned space flight and landing operations. For instance, an appropriate representation of lunar gravitational fields can be attained through servo controlled vertical tethering systems. Lunar atmospheric conditions will be considered through the use of scaling techniques and analog models for correlation with crew participation.

Lunar landing problems will be investigated through tethered operation of full-scale landing vehicles. Thus, developmental programs and crew training will be facilitated. The effects of lunar gravity on vehicle dynamics will also be simulated through servo control of the vertical tethering device. Scale models and analog representation will also be possible. Lunar soil mechanics will be simulated to the extent permitted by the earth's atmosphere and gravitational field. There will also be a free flight capability for those lunar landing systems which can best be represented by this technique. Safety will be assured through the use of special crew tethering devices, ejection seats, or other necessary appurtenances.

In the development of staging mechanics, full-scale interface problems may be investigated where zero or appropriate accelerations may be simulated by servo controlled vertical tethering of either of the modules involved.

Through a representation of applicable gravitational fields by means of servo controlled vertical tethering of either or each of the modules involved, in-flight separation of modules can be studied. This will be of particular importance during an unplanned termination of a mission. The problems to be studied and the subsequent techniques and crew training procedures to be developed will include termination of space flight from trajectory injection near the earth to any stage of lunar landing.

Docking maneuver techniques and crew training involving both tethered and free flight docking will be possible through the servo controlled vertical tethering of each module involved in order to provide a relative zero gravity situation. Impact energy may thus be studied and exercises performed in the mechanical attachment of appropriate interfaces.

The servo controlled vertical tethering device will be used to suspend appropriate modules and equipment so that an analysis of the problems associated with the transfer of crews or cargo from one module to another may be investigated and techniques and equipment developed.

JUSTIFICATION

The development and evaluation of subsystems required for successful lunar landing operations requires a simulation facility which will achieve realistic conditions as closely as possible. Only in this way can the necessary techniques be developed, equipment perfected, and crews gain the necessary experience and training to insure the probability of a successful lunar flight. The facility will be used to develop reliable landing and flight systems such as those relating to the direction control of parachutes, rotating wings, flexible wings, personnel parachutes, and load mitigation schemes involving impact bags, discrete shock absorbers, crushable structures, and braking rockets. These are examples of the subsystems which must be developed, evaluated, and perfected. The facility is also required to train crews in the operation of these systems.

The lunar landing research facility under construction at the Langley Research Center will be used as a basic research tool for study of the factors incident to lunar landing. The facility proposed for the Manned Spacecraft Center will be devoted exclusively to the follow-on development and checkout of system hardware and to the conduct of crew training programs.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$220,000
Utility connections	$80,000	
Power distribution lines	100,000	
Pavement and parking areas	40,000	
C. Facility construction and modifications		2,600,000
Test chamber and test facility structure (60,000 square feet at $32 per square foot)	1,925,000	
Control building (4,000 square feet at $30 per square foot)	120,000	
Specimen preparation and maintenance shop (15,000 square feet at $30 per square foot)	450,000	
Administration building (5,250 square feet at $20 per square foot)	105,000	
D. Equipment, instrumentation, and support systems		2,930,000
Cranes	416,000	
Horizontal drive gear and arrestors	124,000	
Vertical cable driver and arrestors	260,000	
Electric equipment and controls	410,000	
Attitude control	155,000	
Data recording and evaluation equipment	475,000	
Simulator controls	485,000	
Communications equipment	110,000	
Mobile handling equipment	135,000	
Test and checkout equipment	360,000	
E. Design and engineering services		750,000
Total estimated cost		6,500,000

Mr. THOMAS. What is this?

Mr. HOLMES. This is a building which will be rigged and instrumented—the definitive detail is not worked out, but the general concept is—so as to allow us, probably by tethering, to stimulate landing on the moon or landing in a much reduced gravity. This facility will be used both for development of the equipment to be used in landing as well as to train the astronauts in this very critical maneuver. It is probably one of the most critical maneuvers to be made in the operation.

Mr. THOMAS. You have some construction costs of $32 per square foot. What is the nature of the test chamber so that it costs $32 per square foot for construction? This is not for equipment.

Mr. HOLMES. No, but it is a chamber which must house this entire mechanical rig which will permit one to tether rather large weights and move them around so that these weights or instruments will think they are in a one-sixth gravity field.

Mr. THOMAS. Is it heavy steel and concrete?

Mr. HOLMES. Yes.

Mr. WYATT. It is a building 210 feet high, a 20-story building, essentially open, like a balloon hangar type of construction. It is very large in order to get the vertical distances and the motions you want in simulating this landing.

Mr. HOLMES. It must stand the loading, being this high, of overhead cranes, and so forth, so we can tether the objects we wish to test.

SITE DEVELOPMENT AND UTILITY INSTALLATIONS

Mr. THOMAS. Put CF9–D1, 2, and 3 and the cost figures in the record.

(The pages referred to follow:)

Site Development and Utility Installations, Manned Spacecraft Center

DESCRIPTION

This project discusses the need for additional site development and basic utility installations required for construction and operation of the facilities at the Manned Spacecraft Center. Site development includes clearing and grading, a basic road system, security fencing, docks, ramps, and street lighting. The utility installations will include additions to the electrical power system, central air-conditioning system, water supply treatment and distribution system, storm drainage system, and sanitary sewer system. The location of the facilities to be constructed under this project is shown in the location plan for the Manned Spacecraft Center at the beginning of this section.

JUSTIFICATION

Funds for this purpose were provided in the fiscal year 1962 budget in the amount of $4,540,000. At that time, however, the location of the Manned Spacecraft Center had not been determined; estimates were prepared on the basis of previous experience with site development. Following the choice of location, a reappraisal of utility costs has indicated an additional requirement for $7,625,000 which may be ascribed to the following factors:

(*a*) Commercial water and sewage systems are not available; therefore, water and sewage treatment plants must be constructed.

(*b*) Subsoil conditions require underground utility systems to be placed within ducts.

(*c*) The site location adjacent to Clear Lake provides a direct water access route to Galveston Bay. A docking facility is necessary to permit maximum utilization of this water route.

(*d*) Grading and water table conditions will require increased earth movement and erosion control work.

(*e*) The final layout of facilities requires an extension of roads and utility runs for the sewer, water, electrical, gas, heating, and cooling distribution systems.

(*f*) Additional site development and utility installation requirements result from the new facilities proposed for construction in the fiscal year 1963 budget.

A summary of facility requirements and significant design parameters follows:

(*a*) *Site drainage.*—Surface water and storm water will be removed from the site by a system of open ditches and underground conduits. Curbed areas and roadways with curbs and gutters will drain through inlets into underground storm sewers. The unimproved areas, paved streets, and parking areas not confined by curbs will drain through open surface ditches.

(*b*) *Road system.*—A primary service system for major access to the building complex area, and a secondary service system for perimeter and other secondary roads will be provided. Primary access to the building complex area will be a four-lane divided highway. The basic street system adjacent to and within the major building areas is planned as a four-lane arrangement.

The access road from the barge dock to the testing area is planned as a street of adequate width to accommodate the movement of an object 40 feet in diameter by 100 feet in length.

The primary and secondary road systems and the parking areas will be designed for flexible bituminous pavements; the primary roads and the parking areas will also have concrete curbs and gutters.

(*c*) *Barge berthing facilities.*—Facilities will be required at the Center to handle normal cargo barges and to handle a special barge which will carry spacecraft components. The barge dock will be located on Clear Lake, centered on the access road to the project site. An approach channel will be dredged to tie into an existing barge channel about 7,300 feet away. The new channel will be sized to accommodate the special barge.

(*d*) *Potable water system.*—This system will be designed to supply domestic water needs and water requirements of the fire protection system. The water system will consist generally of wells, pumps, a storage reservoir, an elevated tank, a piping distribution system, and chlorination equipment. The piping system will be designed to accommodate anticipated future requirements.

The water supply system can then be expanded by the addition of new wells, pumps, and other equipment as may be required to keep pace with the growth of the center.

(*e*) *Sanitary sewage system.*—An activated sludge system will be used consisting of underground concrete piping properly sized and sloped. It is presently anticipated that gravity flow will be used throughout the system. However, the final arrangement of buildings and underground facilities may result in a requirement for a sewage lift station.

(*f*) *Electrical system.*—A Houston Light & Power Co. 138-kilovolt transmission line connecting two of their generating stations bordering the west edge of the site will be tapped with appropriate switching in the primary unit substation to provide a reliable power source.

The primary unit substation will contain two 138-kilovolt to 13.8-kilovolt, 15,000/20,000/25,000 kilovolt-ampere transformers, attendant switch gear and provisions for future additional transformers.

Underground cables in concrete-encased nonmetallic conduit will distribute power from the primary unit substation to a 13.8-kilovolt switching station in the central utilities area. The conduit system will be constructed to provide for future expansion.

The 13.8-kilovolt switching station will consist of a double-ended 15-kilovolt air circuit breaker metal-clad unit, with a tie breaker.

(*g*) *Central heating and cooling plant.*—This plant will be designed to supply in an economical and efficient manner the principal requirements for comfort heating, cooling, and humidity control. Certain special facilities may require separate heating and cooling systems not connected with the central plant.

The plant will be designed to take care of present requirements and will include suitable standby equipment to allow for normal maintenance and outage without interruption of service. The capacity of the plant can be increased in the future by the incremental addition of heating and cooling units as required. Suitable provisions will be made to allow the future units to be installed with a minimum of equipment down time.

Several types of heating and cooling systems have been studied to determine the most economical arrangement. The recommended system consists basically of a centrifugal compression refrigeration system with the necessary heat exchangers and accessories for providing chilled water, and a steam generation system for supplying heat to the buildings and motive steam to the turbines. It is anticipated that the boilers will be gas-fired, water tube, package steam generating units utilizing a stand-by fuel oil system for emergency firing. This selection is subject to the results of a fuels study presently being made.

(*h*) *Fuel system.*—For the purposes of master planning and preliminary design studies, natural gas has been assumed to be the primary fuel for the center. Studies are proceeding on this basis because of the availability and reliability of natural gas in the Clear Lake area. However, studies are also being made to analyze alternate fuel sources.

(*i*) *Site service buildings.*—This item covers the central fire station, two gatehouses for the control of traffic, the sewage treatment building, and other miscellaneous buildings.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition	[1] $1,400,000	
B. Site development and utility installations	2,740,000	$5,515,800
Underground utility structure	465,000	796,500
Site preparation	280,000	475,400
Roads and streets	340,000	580,600
Vehicle parking	460,000	348,000
Docks and waterways		222,400
Landscaping	185,000	315,000
Electrical distribution	545,000	1,141,500
Street and area lighting		200,000
Communication and fire alarm conduit installation	100,000	159,300
Gas distribution	30,000	50,000
Sewage treatment and piping	85,000	146,300
Water treatment and distribution	250,000	430,600
Distribution piping for heating and cooling		650,200
C. Facility construction and modifications	300,200	759,000
Water treatment building (216 square feet at $25.50 per square foot)	5,500	
Sewage treatment building (216 square feet at $25.50 per square foot)	5,500	
Sewage treatment settling tanks	80,000	
Central heating and cooling plant (21,000 square feet at $40 per square foot)	209,200	641,000
Fire station (5,200 square feet at $21.50 per square foot)		112,000
Gate houses; 2 each (200 square feet at $15 per square foot)		6,000
D. Equipment, instrumentation, and support systems	660,000	
Boilers, feed pumps, and accessories	260,000	
Water chilling equipment	400,000	
E. Design and engineering services	[2] 839,800	[2] 1,350,200
Total estimated cost	5,940,000	7,625,000

[1] Proposed for acquisition using emergency construction authorization procedures and funding by transfer from the research and development appropriation.

[2] Includes a total of $1,614,200 for Corps of Engineers services in connection with the design and construction supervision of the entire center for the fiscal years 1962 and 1963 not contemplated in the original budget submission for the center; the balance of the funding requested is required for the normal design and engineering services for the items that comprise this project.

Mr. THOMAS. Funds for this purpose were provided in the 1962 budget in the amount of $4.5 million. Why the overrun of $2 million in your site development?

Mr. HOLMES. As you know, this facility will be a continuing development. In fact, when I indicated that these items were complete, that was a factual statement as far as runout costs, but certainly additional items will be required in the fiscal years to come. Marshall Space Center, to my mind, is a very major installation for the country which must continue to grow, just as this site is growing and being developed.

Dr. DRYDEN. I think the main element here was that the exact location of the buildings had not been decided when the first estimate was made.

MARSHALL SPACE FLIGHT CENTER

Mr. THOMAS. Let us take a look at Marshall. Put page CF10–A1 in the record.

(The page referred to follows:)

Marshall Space Flight Center

Addition to Computation Division building	$1,255,000
Components test facility	4,000,000
Components and subassembly acceptance building	950,000
Engineering and administration building	2,500,000
Expansion of instrumentation systems in west area	4,000,000
F–1 engine test stand	4,500,000
Hydraulic test facility	340,000
Low temperature facility	575,000
Modification of west side of static test stand	2,000,000
Engineering building	1,000,000
Instrument laboratory	2,000,000
Support facilities in west area	7,800,000
Utility installations	2,517,000
Total	33,437,000

Mr. THOMAS. You have here 13 items at $33.4 million.

This is Dr. von Braun's setup.

Dr. DRYDEN. That is correct.

Mr. THOMAS. He was here and went into this with us in some detail. He has expansion of the instrumentation system in the west area, $4 million; F–1 engine test stand, $4.5 million; modification of the west side of the static test stand, $2 million; support facilities in west area, $7.8 million; utility installations, $2.5 million.

ENGINEERING AND ADMINISTRATION BUILDING

Mr. THOMAS. Put in the record pages CF10–D 1 and 3.

(The pages referred to follow:)

ENGINEERING AND ADMINISTRATION BUILDING, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

It is proposed to construct a five-story office building adjacent to the central laboratory and office building. The structure will be 247.5 feet long by 85.5 feet wide and will provide a gross floor area of 105,800 square feet. Construction will be of steel frame with metal curtain walls and built-up roofing. The building will be air conditioned. The project also includes site preparation, utility connections, and a 400 vehicle parking area. The proposed addition will provide working space for about 850 personnel.

JUSTIFICATION

This building is required to provide the Marshall Center with the additional office space needed to support the planned increase in personnel created by the acceleration of the manned lunar program. The program will require an increasing amount of research, development, and production work to be contracted to private industry which will in turn necessitate an increased support in the management, procurement, and administrative areas.

To provide for the efficient management of the space programs assigned to the center, it is essential that the associated personnel be centrally located and in close proximity. The total scheduled increase in personnel for the period beginning July 1, 1961, and extending through the fiscal year 1963 is 1,430. Other facilities being requested or under construction will provide for all but approximately 850 of this increase. The proposed engineering and administration building should be available for occupancy by the end of the calendar year 1963.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$284,000
Site preparation	$50,000	
Utility connections	140,000	
Parking facilities	94,000	
C. Facility construction and modifications: Building (105,800 square feet at $19 per square foot)		2,010,000
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		206,000
Total estimated cost		2,500,000

ADDITIONAL ENGINEERING BUILDING

Mr. THOMAS. What about this expansion? Two years ago did we not give you funds to build that new engineering building? Is this a separate structure from that?

Mr. HOLMES. This is the expansion of instrumentation systems in west area, Mr. Chairman, or D–1?

Dr. DRYDEN. D–1.

Mr. HOLMES. Yes, you did. We are building that. This is still additional required housing facilities, with the impact of the development of these large boosters—both the ADVANCED SATURN and the NOVA—as well as continuing the present SATURN to become really an operational vehicle.

Mr. THOMAS. What about the engineering and administration building at $2.5 million on page D–1?

Mr. HOLMES. We need it to house the additional people necessary to carry on this increased development.

Mr. THOMAS. Is the Army still in the administration building with you?

Mr. HOLMES. In the present building, yes, but there is another building going up which you authorized for us, as you know.

Mr. THOMAS. You got funds 2 years ago for a new administration building.

Mr. HOLMES. Yes, sir. That is not occupied yet.

Mr. THOMAS. And this is still additional?

Mr. HOLMES. This is still additional.

Mr. THOMAS. Where will that be located?

Mr. HOLMES. In that same immediate area there.

Mr. THOMAS. Let us look at D–1 and see how many square feet there are in this one.

Dr. DRYDEN. There are 105,000 square feet.

Mr. THOMAS. How many were in the one you got money for last year or the year before last? This structure will be 247.5 feet long by 85.5 feet wide, and will have a gross area of 105,800 square feet. How much office space will the good doctor have when he gets done down there?

Mr. ULMER. It is about the same size as the previous building which was authorized, Mr. Thomas.

MODIFICATION OF TEST STANDS

Mr. THOMAS. You are constructing two office buildings, two engineering buildings, expanding the test stands, modifying the west side. Is he going to put some more gantries over there alongside the other ones, or what?

Mr. HOLMES. Yes. The modification of the west side of the static test stand—is modifying an old JUPITER test stand—provides two test stands for the SATURN. In addition, we are putting up a test stand for the ADVANCED SATURN.

Mr. THOMAS. He already has one for the SATURN.

Mr. HOLMES. He has 1 for SATURN, but because the basic development work in the building of the first 10 vehicles for SATURN is being done at Marshall, it is essential to have 2 stands.

Mr. THOMAS. It is all wrapped up and completed now for SATURN?

Mr. HOLMES. The first one, yes.

Dr. DRYDEN. This is a similar stand on the same pier. It has SATURN on one side, and the mounting for the second is on the other.

Mr. THOMAS. How firm are these costs?

Mr. HOLMES. All except three are estimates of full runout cost. The components test facility——

Mr. THOMAS. Who is doing all this figuring?

Dr. DRYDEN. Dr. von Braun.

Mr. HOLMES. Dr. von Braun's people, primarily. They get some architectural and engineering help on this.

Mr. THOMAS. Is Dr. Rees dong any of this?

Mr. HOLMES. Yes. I am sure he is participating; yes, sir.

Mr. THOMAS. Do you have to have all these new facilities here?

Mr. HOLMES. Yes, I really think we have to have them to do the job which we are putting on Marshall.

Mr. THOMAS. You do the testing and send it down to Dr. Debus for firing?

Mr. HOLMES. Yes, sir.

ADDITIONAL PROJECTS AT MARSHALL SPACE CENTER

Mr. THOMAS. Mr. Reporter, we went into the Marshall Center in detail the other day when Dr. von Braun was here. Complete the record by inserting the justification and cost estimates for the other items that make up this figure of $33.4 million.

(The material referred to follows:)

ADDITION TO COMPUTATION DIVISION BUILDING, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

This project discusses the need for an addition of approximately 34,700 square feet to the computation building. The three existing two-story wings will each be extended 120 feet west with an overhead enclosed corridor between the wings. The new construction will be compatible with the existing structure with respect to architecture, material, power, heating, and air conditioning. The type of construction will be steel, concrete, and masonry blocks. Elevated floors will be required for the first floors of the additions to wings A and B, and for the second floor of the addition to wing C. The project includes a new outdoor unit substation, new air-conditioning equipment complete with precise humidity and

temperature controls, a new freight elevator, and a new parking area west of the building addition for 150 cars.

JUSTIFICATION

The proposed addition is required to provide space for computer equipment and for additional personnel required in the ADVANCED SATURN program. Specific requirements for each wing follow:

A wing: Space is required for additional vibrational, telemetry, optical, data translation, and plotting equipment. Present data reduction equipment was designed to support the JUPITER and PERSHING programs and has been modified to the limit of its capability in supporting the SATURN C–1 program. The equipment cannot be adequately modified further to support the more ADVANCED SATURN programs. Working space is also for the additional mathematicians needed to handle an increased workload. With this addition, the Marshall Center will maintain capability to reduce all SATURN data.

B wing: Space in this wing is required for an additional large-size digital computer. Presently there are two major scientific digital computer systems housed in this wing. It was necessary to temporarily move another computer, used basically for management operations, to a converted warehouse when the second major computer was added in 1960. Environmental conditions in the warehouse have not permitted fully satisfactory operations. It is planned to relocate the warehouse computer into the three-wing addition.

C wing: More space is required in this wing to provide additional supporting facilities for a 3-axis flight simulator; a room for patching problem boards; space for approximately 180 additional amplifiers; equipment necessary to couple digital computers in B wing with an analog computer in this wing (this system will provide precise real time data in digital form); a darkroom for novel simulating equipment; computer training facilities; and space for additional specialized and support personnel. The complexity of the ADVANCED SATURN program requires that more calculations and measurements be made; the additional equipment and facilities listed above are required for the increased workload in the analog computer field.

Cost estimate

A. Land acquistion		
B. Site development and utility installations		$110,000
Site development	$20,000	
Utility installation	40,000	
Parking facilities	50,000	
C. Facility construction and modifications—Building addition (34,700 square feet at $30 per square foot)		1,041,000
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		104,000
Design services	70,000	
Engineering services	34,000	
Total estimated cost		1,255,000

COMPONENTS TEST FACILITY, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

A new components test facility is required for the testing of vehicle and propulsion system components. The new facility will supplement existing facilities which are becoming inadequate due to the physical limitations of the test cells and to the inadequate quantities of propellants that can be handled in the test cells. The major items in this project include modifications to the existing components test laboratory, two new test stands, a cable transmission tunnel, a control and operations center, an instrumentation system, and a test control system.

A more detailed description of the project follows below:

(*a*) *Modifications to the existing components test laboratory.*—Modifications to and an extension of the existing structure are necessary to accommodate the installation of approximately 500 additional channels of instrumentation, cable termination columns, patch panels, and signal-conditioning equipment. The modifications will include the removal of all mechanical support functions to the new control and operations center; erection of concrete block partitions; installation of ceilings with integral fluorescent lighting; expansion of the existing

mechanical equipment room to provide air conditioning to all new areas; the construction of a 3,300-square-foot addition on the south side of the building to accommodate the terminal room cable patching area, and instrument preparation area. Offices for engineers and a data reviewing area will also be provided. The addition will be constructed of reinforced (blast-resistant) concrete. A new 11,250-square-foot support building will be constructed to house the relocated mechanical support functions.

(*b*) *Instrumentation system.*—The instrumentation system will be located in a modified area of the existing components test laboratory. The system will be designed to permit maximum utilization of the recording channels to support the two new test stands and to supplement the instrumentation presently supporting the test calls in the existing components test laboratory. For high-density testing in the two new test stands, the instrumentation in the present recording center will be augmented. The present recording center has a permanently installed capacity of approximately 300 channels. The added instrumentation will provide an additional 500 channels.

(*c*) *Cable transmission tunnel.*—A reinforced concrete tunnel will be constructed from the existing components test laboratory to the area of the propellant shop support building, approximately 500 linear feet. A complete tray system to support instrumentation cables will be provided.

(*d*) *Control and operations center.*—The control and operations center will be an addition to and integrated with the existing propellant shop support building. The addition will be a two-story, above-grade structure, with sufficient space below grade to accommodate cable distribution, termination, patching, and signal-conditioning equipment. The area required in this addition will be approximately 18,000 square feet. Two floors above grade level will provide space for the functions of control and observation, mechanical preparation, engineers' offices, building equipment, visitor observation, and restrooms. The building will be constructed of reinforced (blast-resistant) concrete, and will be air conditioned and humidity controlled, where required, to provide protection for instrumentation. The existing propellant shop support building will be modified to accommodate additional mechanical support for existing and added test positions. Modifications will mainly consist of the installation of equipment and associated utilities.

(*e*) *Test stands.*—The new complex will include two multipurpose dual test positions. The dual test positions are to be utilized for development and test of engine and vehicle components, subsystems, and assemblies; and for the checkout and evaluation of a simulated closed-loop engine control system. Components such as turbopumps, gas generators, heat exchangers, valves, flow-controllers, pressurization systems, and venting and turbine exhaust systems will be tested in these positions. The safety distance to other facilities planned for the dual test positions will allow the use of large amounts of liquid hydrogen. This is a mandatory requirement in the components test facility area. The flexibility of the proposed design will allow for the quick conversion of the positions for hot or cold testing of smaller engine systems. The stands will be single-story structures, constructed of heavy, reinforced concrete. Each position will include fuel and oxidizer tankage for test runs and storage, a small space for calibration and instrumentation equipment, instrumentation cable duct banks to the control building, a high-pressure gas system, a firefighting system, and oral and aural warning systems. Each test position will have a small slab-on-grade concrete-block service building to house mechanical and electrical equipment and a small test preparation area. Site improvements about the test stands will include an integral road system with adequate area lighting.

(*f*) *Control system.*—Control systems will be provided to support the multipurpose test positions and their supporting facilities. The items to be provided include cable systems, communication systems, control consoles, racks, patch panels, metering equipment, closed-loop video systems, engineering equipment, photographic equipment, optical observation aids, and remotely controlled electromechanical items. Maximum emphasis will be placed on flexibility, maintainability, and safety.

JUSTIFICATION

The facilities proposed in this project are required for extensive and comprehensive test programs on the components, both as individual units and as parts of systems, of advanced space vehicles. The facilities will be used to isolate malfunctions of components from captive and flight system test data, and for systems tests of manufacturers' components.

The capacity of the existing components test facility is suitable for components and subassemblies of the size used in the SATURN C–1 stages and the H–1 engines. The new components and subassemblies that will be used in the ADVANCED SATURN stages and in the F–1 engines are beyond the capacity of the existing cells. The added time required to set up and dismantle these large components establishes the requirement for four test positions. The proposed use of large amounts of liquid hydrogen in the components test program dictates the requirement for distance separation of the two dual position stands. The test cells in the existing components test facility are too small and too closely grouped to safely handle these advanced programs.

Because of the urgent need for this facility, funds for advanced design services have been allocated from the 1962 appropriation. Additional fiscal year 1962 funds are proposed to be reprogramed to permit construction to be initiated promptly; emergency construction authorization procedures will be used for this purpose. The cost estimate that follows indicates the required funding distribution between the fiscal years 1962 and 1963.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition		
B. Site development and utility installations	$50,000	$270,000
Site preparation	20,000	85,000
Utility connections	30,000	185,000
C. Facility construction and modifications	450,000	1,072,000
Test positions		420,000
Control center (18,000 square feet at $27.77 per square foot)		500,000
Tunnel and duck bank		122,000
Existing building modifications:		
Building addition (3,300 square feet at $33 per square foot)	109,000	
Building alteration (8,700 square feet at $16.22 per square foot)	141,000	
Support building (11,250 square feet at $17.77 per square foot)	200,000	
Test stand support building (2; each 750 square feet at $20 per square foot)		30,000
D. Equipment, instrumentation, and support systems	1,475,000	2,658,000
Propellant systems		50,000
Control consoles	25,000	
Patching equipment	50,000	163,000
Installation and checkout equipment	70,000	300,000
Calibration equipment		200,000
Digital recording and processing equipment	676,000	676,000
Tape recording equipment		79,000
Conditioning equipment	59,000	335,000
Graphic recording equipment	340,000	
Transmission system		472,000
Control equipment		383,000
Distribution wiring	25,000	
Oscillograph recording equipment	230,000	
E. Design and engineering services	[1] 525,000	
Total estimated cost	[2] 2,500,000	4,000,000

[1] Includes $500,000 already allocated for advanced design services.
[2] Proposed for allocation using emergency construction authorization procedures.

Components and Subassembly Acceptance Building, Marshall Space Flight Center

DESCRIPTION

This project proposes the construction of a hangar type building of approximately 30,000 square feet. The building will be 200 feet long; the high bay will be approximately 100 feet wide; and the low bays on the north and south sides will be 25 feet wide. The low bay additions will be air conditioned since they will house special labs and equipment; the hangar will be equipped with ventilators and exhaust fans. Heating is required throughout. Construction will be structural steel framework with corrugated cement asbestos siding. Floor of the high bay will be reinforced concrete to withstand a wheel load of

20,000 pounds per wheel. The low bay floor will be of concrete with no special load requirements. Hangar height of 40 feet (clear) and centered rollup doors 35 feet wide and 36 feet high will be provided. Two cranes of 10 tons capacity will serve the entire high bay area. The majority of the required testing equipment is currently available.

Site preparation will include filling in a low area and rerouting steam piping. The site is ideally located on a direct route from the receiving area to the fabrication facilities.

JUSTIFICATION

The acceptance building is required to provide suitable facilities in which to perform receiving inspection, including nondestructive testing, on such large cumbersome SATURN items as 26 feet diameter bulkheads, mill sheets, and tubes. Typical operations to be performed in the small labs are oil filtration, metrology, gage calibration, and repair. The building will also provide capacity for conducting receiving inspection on major system items, such as SATURN engines, and SATURN tanks, inner stage fairings, and barrel sections. In addition, it will provide space for consolidating the inspection of smaller items resulting in the better utilization of personnel and equipment. Adequate facilities for inspection work on hardware items is essential to an effective quality control program.

Cost estimate

A. Land acquisition		-------
B. Site development and utility installations		$92,000
Site preparation and paving	$42,000	
Utility connections	50,000	
C. Facility construction and modifications: Building, including overhead cranes (30,000 square feet at $25 per square foot)		750,000
D. Equipment, instrumentation, and support systems: X-ray equipment		30,000
E. Design and engineering services		78,000
Total estimated cost		950,000

EXPANSION OF INSTRUMENTATION SYSTEMS IN WEST AREA, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

This project discusses the need for an expansion of the instrumentation systems in the west area for support of the second SATURN static test facility currently under construction. The project includes the design, procurement, fabrication, and installation of instrumentation and control equipment as follows:

(*a*) *Tape units.*—Five tape units will be required consisting of analog magnetic tape recording and reproducing systems for recording vibration measurements or other high-frequency data. The units will be transistorized and will consist of two bays per tape recorder unit.

(*b*) *Oscillograph units.*—Six units are required for recording galvanometer-type oscillographs for acquiring dynamic medium-frequency data. Each unit will consist of three bays and will include two oscillographs, signal conditioning equipment, attenuators, impedance matching networks, selector switches or patches, and intercom stations.

(*c*) *Graphic recorder unit.*—This unit will consist of 6-inch, electronic strip-chart, null-balance-type recorders. The recorders will be used for acquiring static or quasi-static data for indicating critical parameters. The unit will consist of five bays. Included in this five-bay group will be balancing and range potentiometers, carrier oscillators, demodulators, twenty-four 6-inch strip-chart recorders, and intercom stations.

(*d*) *Digital systems.*—Analog-to-digital data acquisition systems of the transistorized type will be utilized in the acquisition of static and quasi-static data. An area of approximately 10 by 22 feet will be required by each basic digital system. Each system will consist of direct current amplifiers, transistorized switches, patchboards, analog-to-digital converter, buffer storage register, time accumulator, system clock oscillator, control counter, bar graph display, buffer and shift register, tape control, tape transports, and tabulators.

(e) *Special instrumentation and equipment.*—This item includes thrust and special recorder groups, instrumentation control console, visual redline monitors, oscillogram processors, checkout equipment, galvanometers, temperature junction and reference boxes, thrust measuring systems, fire detection and temperature rate of rise systems, liquid level systems, real time recording systems, rough combustion cutoff devices, and counters.

(f) *Cables, terminal columns, cable trays, and receptacle boxes.*—Normal interconnecting and supporting equipment is necessary to provide a complete system. Included here are such items as instrumentation distribution and transmission cables, channel-type terminal columns with mounted terminal blocks, expanded metal cable trays and metal enclosure boxes with instrumentation receptacles, and mating instrumentation plugs or connectors.

(g) *Signal conditioning equipment.*—This equipment will include amplifiers, carrier oscillators, demodulators, bridge-balance equipment, position circuitry, discriminators, converters, and filter networks. The conditioning equipment prepares the transducer signals for introduction to the recording and display devices located in the recording area. The amplifiers needed to bring the initial digital systems nearer full capacity are included in the cost estimate for signal conditioning equipment.

(h) *Television equipment.*—Approximately nine television cameras, nine television monitors, control panels, amplifiers, and mountings will be required. This equipment will provide a complete test item observation system so that a visual means of control will be available to the area safety coordinator.

(i) *Cameras.*—Variable-speed motion picture cameras, environmental enclosures, mountings, and lenses are utilized for test instrumentation and documentation.

(j) *Special power system.*—This item includes the emergency power generator system which provides means for safe test termination in the event of a commercial power failure.

JUSTIFICATION

A second SATURN static test stand, authorized in the fiscal year 1961 program and currently under construction, is being proposed for conversion to provide capability for static testing the ADVANCED SATURN stages. It is proposed to use fiscal year 1962 funds and emergency construction authorization procedures for this purpose. The expansion of the West area instrumentation systems described in this project is required for the proper operation of this second stand in connection with its conversion to the ADVANCED SATURN capability.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installations		----------
C. Facility construction and modifications		----------
D. Equipment, instrumentation, and support systems		$3,713,000
5 tape units	$305,000	
6 oscillograph units	410,000	
1 graphic recorder unit	91,000	
2 digital systems	1,401,800	
Special instrumentation and equipment	635,200	
Cables, terminal columns, cable trays, and receptacle boxes	211,000	
Signal conditioning equipment	384,000	
TV equipment	46,000	
Cameras	138,000	
Special power system	91,000	
E. Design and engineering services		287,000
Total estimated cost		4,000,000

F–1 ENGINE TEST STAND, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

This project covers the funds necessary to complete the construction of a test position capable of static test, evaluation, and calibration of a single-unit, F–1 engine in the 1.5-million-pound-thrust class. Fiscal year 1962 funds are proposed to be allocated for site work, utility connections, and for the start of con-

struction work on the test stand. Fiscal year 1963 funds will complete construction of the test stand and will allow procurement of the flame deflector, a tower elevator, a cable terminal room, a firefighting system, complete fuel and oxidizer storage, transfer systems, and engine adaption hardware. The existing control center will be expanded to accommodate additional control, electrical power, and communication instrumentation and equipment. Other features will include a preparation building, a cable transmission tunnel, a high pressure gas system, industrial power, an observation bunker, control and instrumentation equipment, area lighting, and oral and visual warning systems.

JUSTIFICATION

A single engine static test stand is an essential adjunct to the complete stage test stands required for the development of multiengine space vehicle stages. The stand proposed in this project is required by the Marshall Center in the development of stages for the ADVANCED SATURN and NOVA vehicles using clusters of the F–1 engines.

The single engine stand serves the stage development process by proving out or "trouble-shooting" systems design concepts prior to the finalization of the test version of the stage. This single engine test activity is not engine development testing, as such, but rather, subsystem testing wherein the engine is only a component. Subsystem tests also continue throughout the development program when it is advantageous to limit the test variables or to supplement full stage tests with simpler and less costly single engine tests.

As is the case with full stage systems tests, the subsystem testing must be done in close proximity to the site of systems design and fabrication. This is necessary to achieve the day-to-day flexibility of hardware substitution as may be determined by the designer from the evaluation of previous tests.

It is proposed to initiate construction of this stand in the fiscal year 1962 by reprograming available funds and by using emergency construction authorization procedures. The cost estimate that follows indicates the required funding distribution between the fiscal years 1962 and 1963.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition		
B. Site development and utility installations	$475,000	
Site preparation	200,000	
Utility connections	225,000	
Relocation of water system	50,000	
C. Facility construction and modifications	700,000	$1,520,000
Test stand foundation	350,000	
Test stand		900,000
Preparation building (11,400 square feet at $22 per square foot)	250,000	
Deflector		600,000
Observation bunker		20,000
Instrument tunnel	100,000	
D. Equipment, instrumentation, and support systems		2,705,000
Fuel system		45,000
Liquid oxygen system		280,000
High pressure gas system		400,000
Firefighting equipment		150,000
Recording units		122,000
Oscillographs and amplifiers		170,000
Patch panels		78,000
Measuring system		120,000
Cables and terminal columns		300,000
Calibration equipment		180,000
Test and checkout equipment		360,000
Control equipment		500,000
E. Design and engineering services	325,000	275,000
Total estimated cost	[1] 1,500,000	4,500,000

[1] Proposed for allocation using emergency construction authorization procedures.

Hydraulic Test Facility, Marshall Space Flight Center

DESCRIPTION

This project describes the need for the construction of a 45- by 100-foot concrete block building providing 3,600 square feet of testing area, 480 square feet for hydraulic component cleaning equipment, and 420 square feet of engineering space. The testing area will contain a hydraulic component test console, launch and vehicle simulators, and various driving motors and test setups. The component cleaning area will be used to test, inspect, and assemble close tolerance components which are highly sensitive to contamination. Special heating, air conditioning, and positive pressure to prevent dust and other particles of contamination from entering the area will be required.

JUSTIFICATION

The facility is required to conduct research and development tests for the selection, evaluation, and improvement of hydraulic systems and components for future launch and space vehicles.

The critical nature of hydraulic systems used in launch and space vehicles makes it imperative that extreme care be exercised in the research and development of these systems. One of the prime problems is that of hydraulic contamination. The physical tolerances for the valves and regulators, used in the systems are extremely close and malfunction of components and systems can be brought about by the slightest contamination.

At present, tests are being performed in adequate areas such as shop areas and stockrooms, none of which are suitably constructed or conditioned for the conduct of research and development on hydraulic systems space vehicles. Moreover, the varied locations of these inadequate facilities require more manpower and result in the duplication of test setups and equipment. The proposed facility will permit a better utilization of equipment and manpower, and will provide the additional space and equipment to support an increasing workload.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$23,000
Site work	$12,000	
Utility connections	11,000	
C. Facility construction and modifications: Building (4,500 square feet at $38 per square foot)		171,000
D. Equipment, instrumentation, and support systems		117,000
Clean room equipment	$20,000	
Support system	30,000	
Ultrasonic cleaner	12,000	
Filtering stand	5,000	
Hydraulic servo test stand	35,000	
Varidrive motor	15,000	
E. Design and engineering services		29,000
Total estimated cost		340,000

Low-Temperature Facility, Marshall Space Flight Center

DESCRIPTION

A facility is required in which samples of materials used in space vehicles can be investigated to determine how they react when subjected to temperatures in the liquid hydrogen range (−423° F.). The facility will consist of a 4,200-square-foot building with a 15-foot ceiling and a reverse slope roof to reduce the possibility of trapping hydrogen near the ceilings. It will have reinforced concrete walls, special sparkproof finished, grounding facilities, special air conditioning to provide once-through, high-volume airflow, and explosion proof electrical equipment. The building will be divided into test cells, instrumentation rooms, chemistry labs, a cryostat room, a compressor room, and an external area for cryogentic storage and bottled gas storage. The major items of equipment required are fatigue, impact, and tensile strength machines; an instron tester; a systron counter and recorder; a diatron vacuum analyzer; sparkproof tools; and recorders.

The explosive hazard posed by the use of liquid hydrogen requires specially designed facilities.

JUSTIFICATION

The SATURN vehicle program is designed for the application of liquid hydrogen fueled propulsion systems. The facility proposed in this project is required to provide an inhouse capability for determining the effects that extreme low temperatures have upon materials. Only limited data on the application of liquid hydrogen fueled propulsion systems is currently available. An inhouse capability in this area is necessary for independently evaluating the work of contractors.

The facility will also be used for testing materials at very low temperatures. The testing program will include—

(*a*) The determination of coefficients of expansion and contraction.

(*b*) The investigation of the fatigue life of metals.

(*c*) A determination of the tensile strength of plastics, elastomers, metals, and their weldments.

(*d*) An investigation of the impact strength of metals and their weldments, plastics, and adhesives.

(*e*) Studies of extreme-low-temperature lubrication problems.

(*f*) An evaluation of low-temperature insulation materials.

(*g*) An evaluation of the chemical compatibility of fabrication materials with cryogenic propellants.

(*h*) An evaluation of low-temperature sealants and adhesives.

(*i*) The investigation of handling procedures for cryogenic propellants with respect to safety.

(*j*) A quality control analysis of liquid hydrogen.

Cost estimate

A. Land acquisition		-------
B. Site development and utility installations		$32,000
Utility connections	$17,000	
Roads and parking areas	9,200	
Site preparation	5,800	
C. Facility construction and modifications: Building (4,200 sq. ft. at $43 per sq. ft.)		181,000
D. Equipment, instrumentation, and support systems		313,000
Special air-handling equipment	50,000	
Instrumentation	90,000	
Safety equipment	44,000	
Operational equipment	129,000	
E. Design and engineering services		49,000
Total estimated cost		575,000

MODIFICATION OF WEST SIDE OF STATIC TEST STAND, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

It is proposed to modify the west side of the existing SATURN static test stand by the construction, equipping, and instrumentation, of an additional test position with a capability of handling 1,500,000 pounds of thrust. Some fiscal year 1962 advanced design funds have been allocated for this project. Additional fiscal year 1962 funds are proposed to be allocated for the start of construction including the removal of existing platforms and foundations, the construction of new foundations, extensions to utilities, extensions to the propellant and high-pressure gas systems, and necessary site improvements. The modifications will be completed with the funds requested for the fiscal year 1963. The 1963 work will include changes to patch panels, the addition of recorders at the blockhouse, new instrumentation at the test tower, new control consoles, a flame deflector, vehicle support hardware, and a firefighting system.

JUSTIFICATION

A single static test position is currently available on the east side of the SATURN static test stand. This position provides the capability for static testing the C–1 stage of the SATURN vehicle. A second SATURN static test stand, authorized in the fiscal year 1961 program and currently under construction, is being proposed for conversion to provide capability for static testing the ADVANCED SATURN stages. This leaves only the single test position with the C–1 stage capability. An additional test position with this capability is required to meet the accelerated SATURN schedule and to provide backup capability in the event of a catastrophe on the existing test position.

Because of the urgent need for this facility, funds for advanced design services have been allocated from the 1962 appropriation. Additional fiscal year 1962 funds are proposed to be reprogramed to permit construction to be initiated promptly; emergency construction authorization procedures will be used for this purpose. The cost estimate that follows indicates the required funding distribution between the fiscal years 1962 and 1963.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition		
B. Site development and utility installations	$235,000	
Site preparation	55,000	
Demolition	30,000	
Utility connections	150,000	
C Facility construction and modifications	1,277,000	
Test position	1,000,000	
Blockhouse addition (4,000 square feet at $33 per square foot)	132,000	
Addition to annex (7,250 square feet at $20 per square foot)	145,000	
D. Equipment, instrumentation, and support systems	1,239,000	$2,000,000
Propellant and high-pressure gas system	354,000	
Deflector and deflector piping	700,000	
Deflector installation		290,000
Firefighting system		60,000
Vehicle support hardware	65,000	425,000
Signal conditioning equipment	80,000	295,000
Calibration system	40,000	75,000
Patch panel distribution wiring, terminals, and trays		65,000
Receptacle transducers and junction boxes		55,000
Instrumentation installation and checkout		110,000
Transmission systems		88,000
TV, photography, and operation recording systems		88,000
Consoles, racks, and equipment controls		48,000
Warning and intercommunication systems		29,000
Ground support equipment		372,000
E. Design and engineering services	[1] 516,000	
Total estimated cost	[2] 3,267,000	2,000,000

[1] Includes $175,000 already allocated for advanced design services.
[2] Proposed for allocation using emergency construction authorization procedures.

ENGINEERING BUILDING, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

It is proposed to construct a two-story engineering building containing approximately 30,000 square feet of area. The building will be of reinforced masonry construction with secondary interior wall systems treated to provide sound and vibration isolation from the mechanical equipment necessary to the function of the building. All other interior partitions will be of the prefabricated metal type for purposes of flexibility. Floors will be concrete, covered with composition tile. Exterior walls will be exposed painted masonry.

JUSTIFICATION

Additional office space is required to house the engineering and scientific personnel concerned with operation of the additional test facilities being provided in support of the ADVANCED SATURN program. The building will provide space for approximately 250 people. It is contemplated that a large portion of these people will be contractor personnel assigned to component, stage, and engine test programs.

Cost estimate

A. Land acqusition		
B. Site development and utility installations		$75,000
Grading, fill, and drainage	$32,000	
Parking area	20,000	
Roads and walks	6,000	
Utility connections	17,000	
C. Facility construction and modifications		660,000
Building (30,000 sq. ft. at $22 per sq. ft.)	$660,000	
D. Equipment, instrumentation, and support systems		175,000
Office furniture and equipment	$140,000	
Cafeteria equipment	35,000	
E. Design and engineering services		90,000
Total estimated cost		1,000,000

INSTRUMENT LABORATORY, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

It is proposed to construct a new instrument laboratory of approximately 14,100 square feet. The laboratory will consist of (1) a single story masonry unit with a floor of concrete slab-on-grade and (2) a high-bay mill-type building with crane pits for calibrators and pads for the storage of calibrator weights. The building will be air conditioned. Work areas will be provided as follows:

(*a*) *Acoustics.*—An area is required to test, evaluate, and calibrate high and low level sound, vibration, and shock instrumentation; and sound measuring and acoustic calibration instrumentation and auxiliary electronic instruments and equipment.

(*b*) *Instrument shop.*—A small precision machine shop, equipped to perform close tolerance machining operations is required. Part of the equipment is available, but must be supplemented with power tools, workbenches, and measuring tools.

(*c*) *Instrument design.*—A small design and engineering group is required to provide backup for instrument makers.

(*d*) *General pressure and thrust unit.*—An area will be provided to conduct pressure and thrust calibration. The equipment required will consist of an environment test chamber, instrument panels, recording and indicating instrumentation, a universal load testing machine, vacuum pumps, and compressed air regulating facilities.

(*e*) *Load cell and heavy instrument storage.*—An area for the storage of heavy precision load cells is included.

(*f*) *Gage storage.*—An area will be provided for the storage of the many different types of gages required in instrument work.

(*g*) *Pressure and thrust precision calibration.*—This room will contain high precision reference or transfer standards necessary to insure the accuracy of those instruments used daily. Primarily standards such as dead weights testers, pressure balances, and liquid manometers are needed.

(*h*) *Electronic area for propellant flow and liquid level sensors.*—An area is required for the maintenance, repair, and storage of electronic equipment used in the accurate measurement of propellant flow and liquid level. Instruments such as oscilloscopes, oscillographs, counters, and bridges are necessary.

(*i*) *General flowmeter calibration.*—A specially designed area is needed for flowmeter calibration, testing, cleaning, and repair. The required equipment includes two interior-mounted tanks of 3,000-gallon capacity each, and three pairs of smaller tanks, all equipped with pressure regulating devices, piping systems, and racks with recording, counting, and indicating devices.

(*j*) *Ultrasonic flow calibration.*—An area is required to test and calibrate gas flowmeters, sonic nozzles, pilot tubes, flowrators, and wet-test meters.

(*k*) *Load cell calibration bay.*—This area will house the equipment needed for the precision calibration of heavy single and multiple load cell configurations. The equipment required includes one 1,500-pound load cell calibrator, one 200,000-pound load cell calibrator, and an asortment of calibration masses (dead-weights) and special related equipment. Operational, control, and recording equipment for calibration purposes will be provided in an adjoining room.

JUSTIFICATION

The instrument laboratory is required for the design, development calibration, repair, modification, and evaluation of highly complex, accurate measuring devices used in the static test firing and cold flow testing of present and future space boosters and their components. The static firing tests of the clustered SATURN booster require a minimum of 900 channels of information. Each channel requires instrumentation pickups at the functioning station on the booster. Much of the instrumentation is highly specialized and cannot be obtained commercially. Items must be modified and calibrated to meet the rigid standards of the testing procedures. In addition, the use of liquid hydrogen has introduced problems in measurement that cannot adequately be met with existing facilities.

The burden of providing highly specialized test instrumentation is currently being accomplished by personnel working in three different buildings totaling approximately 11,000 square feet. The proposed new laboratory will bring these scattered interdependent operations together; it will also provide the necessary additional space and instrumentation for support of the ADVANCED SATURN program and for support of the additional test facilities being requested for the Marshall Center for that program.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$25,000
Site work	$4,000	
Utility connections	21,000	
C. Facility construction and modifications		475,000
Building (14,100 square feet at $33.70 per square foot)	$475,000	
D. Equipment, instrumentation, and support systems		1,240,000
Laboratory equipment	$540,000	
Laboratory instrumentation	150,000	
Standards for temperatures, pressures, and masses	170,000	
Load cell calibration equipment	200,000	
Flowmeter calibration services	180,000	
E. Design and engineering services		260,000
Total estimated cost		2,000,000

SUPPORT FACILITIES IN WEST AREA, MARSHALL SPACE FLIGHT CENTER

DESCRIPTION

This project provides for the expansion of support facilities required for static testing the ADVANCED SATURN vehicle in the west area. The scope of work includes:

(*a*) *High-pressure water system.*—The high-pressure water system will be increased from its capability of 70,000 to 220,000 gallons per minute. Modifications will include an increased reservior capacity and a new pumping station with necessary pumps, drives, pipelines, valving, and a control system.

(*b*) *Fuel system.*—The fuel system capacity will be increased from 50,000 to 250,000 gallons. Items required are storage tanks, pumps, valves, filters, a fire-fighting system, and a transfer system to and from the test stand.

(*c*) *Liquid oxygen system.*—The liquid oxygen system capacity will be increased from 75,000 to 375,000 gallons. Items required are storage tanks, pumps, valves, unloading facilities, filters, and transfer piping to test stand.

(*d*) *Helium system.*—A completely new helium pressurizing gas system will be installed. Items required will include railroad receiving facilities; a com-

pressor station complete with compressors, valves, filters, and controls; high-pressure storage tanks; and transfer piping to test stand.

(e) *Liquid nitrogen system.*—A liquid nitrogen system will be installed. Items required include vacuum jacketed storage tanks, transfer pumps, valves, filters and transfer piping to the test stand.

JUSTIFICATION

The decision to modify the SATURN static test stand currently under construction to provide capability for static testing the ADVANCED SATURN requires significant modifications in the capacities of the support systems for that stand. For example, the high-pressure water required for the thrust of the 7.5-million-pound booster is 220,000 gallons per minute, in lieu of the previously designed 70,000 gallons per minute.

The booster size of the ADVANCED SATURN requires the storage and transfer of large quantities of fuel. The fill rates of fuel for static testing have been established as the same fill rates required at launch time. To meet this requirement the entire quantity of fuel needed for static testing must be stored in the test area, requiring a storage capacity of 250,000 gallons. In addition, the pumping capacity and transfer system must be capable of handling a flow of 2,000 gallons per minute. The original design of flow was for 750 gallons per minute.

The booster size of the ADVANCED SATURN requires the storage and transfer of large quantities of liquid oxygen; here again, the fill rates for static testing are the same as for launch. To meet this requirement for liquid oxygen at the test site, the storage of approximately 375,000 gallons will be required. In addition, the pumping capacity and transfer system must be able to handle flows of 10,000 gallons per minute. The original design was for 2,000 gallons per minute. The testing of the ADVANCED SATURN will also require a helium system for pressurization of the fuel and liquid oxygen systems. The helium storage bottles will be cooled by the use of liquid nitrogen.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$510,000
High-pressure waterlines	$410,000	
Railroad extensions	40,000	
Unloading facilities	60,000	
C. Facility construction and modifications		3,025,000
Pumping station building (12,500 square feet at $28.80 per square foot)	$360,000	
Water reservoir	265,000	
Fuel storage tanks	350,000	
Liquid oxygen storage tanks	800,000	
Helium compressor building (5,000 square feet at $20 per square foot)	100,000	
Installation of low-pressure gaseous helium storage vessels	150,000	
High-pressure helium storage vessels	900,000	
Liquid nitrogen storage tanks	100,000	
D. Equipment, instrumentation, and support systems		3,565,000
High-pressure water pumps, equipment, manifolds, and controls	$2,100,000	
Fuel pumps and controls	75,000	
Fuel transfer system	175,000	
Fuel firefighting equipment	50,000	
Liquid oxygen pumps and controls	200,000	
Liquid oxygen transfer systems	250,000	
Liquid oxygen firefighting equipment	100,000	
Helium compressor equipment and controls	215,000	
Helium transfer system	300,000	
Liquid nitrogen transfer system	100,000	
E. Design and engineering services		700,000
Total estimated cost		7,800,000

Utility Installations, Marshall Space Flight Center

DESCRIPTION

Extensions to primary utility systems and road networks are required as follows:

Water.—The installation of an additional filter is required at the potable water treatment plant. New potable and industrial water mains are also required to service new facilities. A new water storage reservoir at the site of the new components test facility is included in the project.

Sewer.—Extension of the sanitary and industrial sewerlines to areas of new construction, and miscellaneous modifications to existing treatment facilities will be funded under this project.

Electric.—The construction of an additional 10,000-kilovolt-ampere unit substation and the expansion of various other substations and distribution systems are included.

Roads.—The project will permit an extension of the road network to support the new facilities included in the 1963 program. The extension will consist of about 1,900 linear feet of gravel and 3,000 linear feet of paved road for general traffic. In addition, about 7.5 miles of existing road will be modified to accommodate the ADVANCED SATURN configurations. The modifications will consist of widening pavement, strengthening and lengthening culverts, bridge improvements, clearance improvements, and dock area enlargement.

JUSTIFICATION

The utility improvements described in this project are required to support the new Marshall Center facilities proposed for construction in the fiscal year 1963 budget submission. The project covers improvements or expansions to the utility systems of the center which cannot specifically be identified with any single facility. Normal utility connections and access roads are included under the applicable projects they serve.

During peak hot weather periods, the desirable water filtration rate is exceeded. The locations and demands of the new facilities require increased main sizes and extensions to provide the required quantities and pressures.

New sewer mains and an extension of existing mains will be required to serve new buildings and test facilities. The additional load will require some modification to the treatment plant to meet legal standards.

The expanded area of operations and the increased demand will soon cause the primary and secondary electrical distribution systems to become overloaded. A large expansion in substation transformer capability and an extension of the electrical network will have to be provided to meet the increase in electrical power demand.

The existing road network has been used for transporting the first stage of the SATURN C–1 vehicle. This vehicle is 80 feet long and 22 feet wide, and weighs approximately 45 tons empty. Initial development work and the static testing of the first stage of the ADVANCED SATURN vehicle will also be accomplished at the Marshall Center. This vehicle stage will be fabricated at the shop area and transported over the same roads to the testing area. In addition, the first five flight test vehicles of the ADVANCED SATURN, which will be fabricated at the Michoud plant, will be waterborne to the Marshall Center, then transported from the dock area to the test area over these roads. The first stage of the ADVANCED SATURN vehicle, 140 feet long and 33 feet wide, will weigh approximately 100 tons empty. The existing road network must be strengthened, widened, and improved to permit the transport of these stages.

Cost estimates

A. Land acquisition		
B. Site development and utility installations		$2,227,000
Water filtration plant	$50,000	
Water reservoir	65,000	
Water mains	85,000	
Sewer mains and treatment plant	100,000	
Electrical substation and distribution system	360,000	
Road improvements within Marshall Center	550,000	
Road improvements within Redstone Arsenal	240,000	
Bridge improvements	537,000	
Dock improvements	240,000	
C. Facility construction and modifications		
D. Equipment, instrumentation, and support systems		
E. Design and engineering services		290,000
Total estimated cost		2,517,000

Michoud Plant

Mr. Thomas. Let us look at the Michoud plant in New Orleans, for which you are requesting $18.4 million, including modifications of $11.4 million. Put pages CF11–A1, 3, 5, 6, and 7 in the record at this point.

(The pages referred to follow:)

Michoud plant—Summary of estimate for 1963

Modifications to Michoud plant	$11,400,000
High pressure test facility	1,000,000
Hydrostatic test and cleaning facility	3,000,000
Vertical assembly building	3,000,000
Total	18,400,000

Modifications to Michoud Plant

Description

Modifications and additions to the Michoud plant are required to adapt the plant for the fabrication and assembly of the S–I SATURN booster and to adapt a portion of the plant for the manufacture and minor assembly of components for the S–IC SATURN booster. A detailed description of project follows:

(*a*) *Additional parking facilities.*—A new parking area accommodating approximately 500 cars will be constructed on the west side of the manufacturing building. Additional shell surfacing and bumper blocks will be added to the existing east parking area.

(*b*) *SATURN dock and access road.*—A new dock and access road will be required for transportation of the SATURN booster. New pavement on the existing road, the relocation of overhead obstructions, and reinforced pavement over existing culverts will also be required. The dock will be located on the Michoud Canal.

(*c*) *Manufacturing building.*—Rehabilitation of manufacturing building air-conditioning system: The heating and air-conditioning system in the manufacturing building will have to be placed in an operational condition by modifying the fan houses. The modifications are required to change the air-conditioning system from an antiquated system producing high humidity (which is deleterious to assembly work) to a modern system producing lower humidities.

Preparation of fabrication and assembly areas for the S–I SATURN booster manufacture: Production areas in the manufacturing building for the S–I SATURN booster will require numerous rooms, enclosures, and open areas. Areas will be provided for receiving and shipping facilities; receiving and in-

spection laboratories; receiving and inspection component test facilities; small and large tube cleaning equipment; painting booths; surface treatment equipment; welding shops; electrical fabrication clean rooms; and spider assembly, tail assembly, tank assembly, and final assembly facilities.

Modifications for these areas include additional lighting, primary and secondary power, hot and cold water, drains, compressed air, shop foreman's offices, toilet areas, exhaust and dust collection systems, overhead crane systems, floor reinforcement in certain areas, foundations, filtered air de-ionized water, and gaseous nitrogen service facilities. A new door will be installed for taking the boosters out the east side of plant.

Modification of dry kiln shop: At the southeast corner of the manufacturing building there is a 26,200-square-foot dry kiln shop originally constructed for PT-boat construction operations. This area will be renovated and modified for the housekeeping contractor maintenance shops to support operations at the Michoud Plant. Modifications will include a new roof, additional lighting and power, partitions and general renovations. Maintenance equipment will be provided by the housekeeping contractor.

Modifications for S–IC manufacturing (machine) shops and minor subassembly area: Modifications for this purpose will include additional lighting, primary and secondary power, floor sealing, shop foreman's office, fencing, water piping, drains, natural gas and compressed air piping, and exhaust and dust collector systems. In addition, an explosion-proof painting area will be provided. This area will be enclosed by a 1-hour firewall and will incorporate such other safety precautions as explosionproof lighting and filtered ventilation and exhaust. A new door will be installed to permit complete booster access.

Installation of data processing and computing area: This area will be used jointly by the S–I and S–IC contractors. It consists of an area of approximately 12,500 square feet centrally located to allow close coordination with both the engineering and finance functions. The area will require a raised floor and special temperature and humidity control.

(*d*) *Modifications to hammer building.*—The existing building has a floor area of 30,700 square feet and will be converted to shop and engineering space for occupancy by the booster assembly contractors. The building has a clear headroom of approximately 21 feet. A second floor will be added within the existing building to double the floor area and to provide additional space for the contractors. Modifications will include renovation of utilities, installation of air conditioning and partitions in the engineering space, general repairs, and filling pits in the floor slab.

(*e*) *Modifications to foundry building.*—The foundry has a floor area of 113,500 square feet with a 40-foot vertical clearance in the hangar area. At the present time, this building houses large melting furnaces, drying ovens, and other foundry equipment installed during the Korean war. After the foundry equipment is disposed of by surplus sales, it is planned to convert the building for checkout positions to permit the complete checkout of the SATURN S–I boosters. Work will include filling existing pits, renovating utilities, and installing instrumentation trenches and cable ducts.

(*f*) *Pneumatic checkout cell.*—An addition to the northwest side of the foundry building is required for the pneumatic checkout of the SATURN booster and component parts. The facility will have approximately 23,000 square feet and will contain a high bay cell of approximately 8,400 square feet. The remaining area will be used for a test-control room, analysis laboratories, pressure bottle containers, and equipment rooms.

JUSTIFICATION

The Michoud Plant at New Orleans, La., has been selected as the manufacturing site for the SATURN S–I and S–IC boosters. Contractors for both these boosters have been selected. In addition, a housekeeping contractor has been selected to provide support services for the Michoud Plant operations.

Provision has been made for only those renovations necessary to permit initial occupancy of the plant by the contractors already selected. This project covers the additional work necessary to adapt the plant for the fabrication and assembly of SATURN S–I boosters, and the modifications required for the manufacturing and minor subassembly of components for the SATURN S–IC booster.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition		
B. Site development and utility installations	$145,000	$550,000
Parking facilities	40,000	100,000
Rehabilitation of utilities	105,000	
Saturn dock and access road		450,000
C. Facility construction and modifications	1,248,000	9,650,000
Rehabilitation of administration building	161,000	
Cleaning and painting	74,000	
Utilities activation	55,000	
Miscellaneous repairs	32,000	
Rehabilitation of engineering building	460,000	
Painting	60,000	
Utilities activation	70,000	
Modification of air-conditioning system	118,000	
Installation of asphalt tile floors	36,000	
Installation of acoustical ceiling	25,000	
General repair and removal of floor obstructions	81,000	
Partitions	70,000	
Rehabilitation of manufacturing building	627,000	7,200,000
Rehabilitation of air-conditioning system		844,000
Removal of steel falsework and relocation of utilities	226,000	
Preparation of fabrication and assembly areas for S-I booster manufacture		4,993,000
Activation of sprinkler system and utility lines	113,000	
Interior repairs and general rehabilitation	162,000	
Modification of dry kiln shop		263,000
Modification for S-IC manufacturing shops and minor subassembly area		650,000
Installation of data processing and computing area		450,000
Removal of partitions and renovation of assembly area	126,000	
Modifications to hammer building		700,000
Modifications to foundry building		1,100,000
Pneumatic checkout cell addition to foundry building		650,000
D. Equipment, instrumentation, and support systems		
E. Design and engineering services	47,000	1,200,000
Total estimated cost	1,440,000	11,400,000

NATURE OF MICHOUD SITE

Mr. THOMAS. Tell us about these modifications.

Mr. HOLMES. These are modifications necessary at the existing facility——

Mr. THOMAS. How much land and buildings do you have there? Did you take it over, or who has title to it?

Mr. ULMER. We do not yet have title to it, but we will get it in this process.

Mr. THOMAS. Who owns it? The Army?

Mr. ULMER. It was an Army plant.

Mr. THOMAS. Are you going to get title and control to it, or is the Army keeping any strings on it?

Mr. ULMER. None whatsoever.

Mr. THOMAS. How many buildings are on it; how many acres of land are involved?

Mr. LILLY. There are 825 acres and 2.5 million feet of manufacturing plant space.

Mr. THOMAS. How good is the space now? It is about 18 or 20 years of age.

Mr. HOLMES. It is really very good space. I think with this rehabilitation, it will make excellent manufacturing facilities. The rehabilitation includes such things as fixing up the air-conditioning system for the manufacturing facility, preparation of the assembly areas for both the S–I booster and then the S–IC booster which, as you know, are the first stage for the SATURN and the ADVANCED SATURN; setting up the SATURN dock and access road, and providing additional parking facilities.

REHABILITATION OF MANUFACTURING BUILDING

Mr. THOMAS. The main item is rehabilitation of the manufacturing building, $7.2 million. What do you mean by rehabilitation? What will you do to it?

Mr. HOLMES. We are going to spend some $800,000 of that on the air-conditioning system. Unless we have a very well controlled environment there, we will have great difficulty.

Mr. THOMAS. Then you have "Preparation of fabrication and assembly areas," $4.9 million. What are you going to do to it?

Mr. HOLMES. We are taking out all the old rig hanging from the high 40-foot ceiling which was used for assembly of tanks. We are setting up the tooling, the handling fixtures, jigs, and so forth, necessary to assemble these large SATURN boosters.

Mr. THOMAS. What do you figure your saving is by modifying these buildings, doing them over? You have an engineering cost here of $1.2 million.

Mr. HOLMES. As contrasted to starting from scratch?

Mr. THOMAS. Yes.

Mr. WYATT. May we go off the record on this point?

(Off the record.)

Mr. THOMAS. How long will it take you to get the property in operation?

Mr. HOLMES. We are using it now as far as engineering space. By this summer, we will have the first equipment set up for doing some work in the factory area.

HYDROSTATIC TEST AND CLEANING FACILITY

Mr. THOMAS. Hydrostatic test and cleaning facility at $3 million. Put pages CF11–C 1 and 2 in the record.

(The pages referred to follow:)

HYDROSTATIC TEST AND CLEANING FACILITY, MICHOUD PLANT

DESCRIPTION

This project involves the construction of a building 125 by 160 feet with an overhead clearance of 75 feet. The overall height of the building will be approximately 90 feet. The project will include a hydrostatic test and cleaning cell, a mechanical equipment room, a control room, and a materials laboratory. The test cell will be 50 feet square by 50 feet high with a floor located 15 feet below the main factory floor area for the retention of test fluids in the event of a tank rupture. Cell walls below the floor line will be reinforced concrete. De-ionized water, detergent, and trichloroethylene storage tanks will be provided to support the test cell operations. All solutions will be filtered, and rotating spray nozzles with vertical travel capabilities, will be provided for cleaning. The used trichloroethylene will flow by gravity to a storage tank to be distilled for reuse. A

mechanical 100,000-pound capacity weighing system (accuracy ±0.03 percent) and an 11,000-gallon batch tank and load cells will be provided for tank volume calibration. Tank drying operations will require filtered hot air and a dry nitrogen system. A chemical cleaning tank 40 feet in diameter will be required for cleaning the gore head assemblies and baffles. This process will require four 10,000-gallon tanks for recycling the cleaning solutions. The major subassembly operations in the area will require a 15-ton crane which will also serve the hydrostatic test and cleaning area.

JUSTIFICATION

The Michoud plant at New Orleans, La., has been chosen as the manufacturing site for the SATURN S–IC booster. The facility requested in this project is required in the manufacturing operations for the S–IC booster. Functions to be performed in the facility include major subassembly of fuel tanks, aft tank head section, center tank shell baffle assembly, and forward tank head section; the hydrostatic test calibration and cleaning of the liquid oxygen and fuel tanks. The present manufacturing area of the Michoud plant is not of sufficient height to perform these functions.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$200,000
Site preparation	$35,000	
Utility connections	55,000	
High and low pressure air systems	35,000	
Steam, water, and chilled water systems	75,000	
C. Facility construction and modifications		1,600,000
Foundations	$400,000	
Building (125 by 160 by 90 feet high; 20,000 square feet at $60 per square foot)	1,200,000	
D. Equipment, instrumentation, and support systems		810,000
Crane	$75,000	
Filtration system	350,000	
Vessels and storage tanks	85,000	
Demineralization system	200,000	
Test controls and instrumentation	100,000	
E. Design and engineering services		390,000
Total estimated cost		3,000,000

NATURE OF HYDROSTATIC TEST AND CLEANING FACILITY

Mr. THOMAS. What is this facility?

Mr. HOLMES. This is a test facility of great vertical height in order to allow one to test hydrostatically the tanks for these boosters, and also to clean them.

Mr. THOMAS. The building is 160 by 125, 90 feet high, at a cost of $60 a square foot. Is it going to carry tremendous weights, or what?

Mr. HOLMES. It is primarily the height of the building that causes the square foot rate to be so high.

Mr. DIAZ. That is correct.

Mr. THOMAS. Is it open space 90 feet high?

Mr. HOLMES. Yes. The tanks can stand upright and be tested and cleaned hydrostatically.

Mr. THOMAS. Is this figure of $3 million the complete cost?

Mr. HOLMES. Yes, sir. It is the complete cost, not a downpayment.

HIGH PRESSURE TEST FACILITY AND VERTICAL ASSEMBLY BUILDING

Mr. THOMAS. Insert in the record the high pressure test facility, pages CF11–B1 and –B3 and the vertical assembly building, CF11–D1.

(The pages referred to follow:)

High Pressure Test Facility, Michoud Plant

DESCRIPTION

A facility is required for testing the fuel tanks and high pressure tubing of the SATURN S-IC booster which will be manufactured at the Michoud plant. The facility will be located approximately 1,500 feet southeast of the manufacturing plant. The project includes a test cell, a control building, and a compressor building. The revetted test cell will contain high pressure pneumatic and water service piping, water fill piping, transducers for pressure sensing, pressure indicating instruments, and drainage facilities. The cell will be provided with sufficient heat to prevent moisture condensation on components, and natural draft ventilation for pressure relief and nitrogen elimination. The control room will contain the test control panel with all necessary shutoff valves, regulating valves, indicating instrument, and recording instruments. Supporting facilities include compressors, liquid nitrogen storage facilities, gaseous nitrogen receivers, and all related piping, valves, and supporting utilities.

JUSTIFICATION

The proposed facility is required to perform high pressure hydrostatic destruct testing, hydrostatic proof testing, and pneumatic leak testing, as required on gaseous nitrogen and helium tanks, and on high pressure tubing. The facility will have the capability of generating hydrostatic pressure up to 10,000 pounds per square inch and pneumatic pressure up to 4,500 pounds per square inch. Due to the safety hazards involved with these high pressures, the testing operations must be performed in a revetted facility isolated from other operations.

The high unit costs of the test cell and control building are due to the need for heavy construction to protect against blast and to the provisions required for the intricate test instrumentation. The soil conditions in the immediate vicinity of the Michoud plant make it necessary that the foundations for the test cell and control building be supported on piling.

The description of facilities and cost figures for this project are based on preliminary planning and may be revised upon completion of master planning studies for the entire plant.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$135,000
Roads and parking areas	$40,000	
Utility connections	70,000	
Site development	25,000	
C. Facility construction and modifications		170,000
Foundations for test cell	$61,000	
Foundations for control building	6,000	
Revetted test cell (1,500 square feet at $56 per square foot)	84,000	
Control building (300 square feet at $30 per square foot)	9,000	
Compressor building (400 square feet at $25 per square foot)	10,000	
D. Equipment, instrumentation, and support systems		565,000
Instrumentation and controls	$275,000	
Compressor	40,000	
Liquid and gaseous nitrogen systems	250,000	
E. Design and engineering services		130,000
Total estimated cost		1,000,000

Vertical Assembly Building, Michoud Plant

DESCRIPTION

This building is required for the vertical assembly of the S–IC stage of the ADVANCED SATURN vehicle. The facility will be constructed adjacent to the hydrostatic test and cleaning facility. It will consist of a building 125 by

160 feet with an overhead clearance of 180 feet. The overall height of the building will be approximately 200 feet. Included in the project are tool foundations, utility connection, service elevators, and the necessary water, steam, and nitrogen piping. The building will be equipped with a 150-ton crane.

JUSTIFICATION

The Michoud Plant at New Orleans, La., has been chosen as the manufacturing site for the SATURN S–IC booster. The building requested in this project is required to provide a facility with sufficient height to perform the final assembly of the S–IC booster. The vertical assembly operations will include joining the thrust structure, the engines, the liquid oxygen tank, the center section, the fuel tank, and the forward section into a single assembly.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$200,000
Site preparation	$35,000	
Utility connections	55,000	
High and low pressure air systems	15,000	
Steam, water, and chilled water systems	95,000	
C. Facility construction and modifications		2,000,000
Foundations	$600,000	
Building (125 by 160 by 200 feet high; 20,000 square feet at $70 per square foot)	1,400,000	
D. Equipment, instrumentation, and support systems		410,000
Crane	$375,000	
Test controls and instrumentation	35,000	
E. Design and engineering services		390,000
Total estimated cost		3,000,000

Mississippi Test Facility

Mr. Thomas. Let us take a look at the Mississippi test facility. Put page CF12–A1 in the record.

(The page referred to follows:)

Mississippi test facility—summary of estimate for 1963

ADVANCED SATURN stage facilities	$36,000,000
NOVA stage test facilities	43,000,000
Utility installations and support facilities	13,500,000
Total	92,500,000

USE OF ASSEMBLY AREAS BY CONTRACTORS

Dr. Dryden. May I get one remark in the record, Mr. Chairman, on both these facilities. In the past, as most of you know, it has been customary to build static test stands and to manufacture in plants associated with a specific contractor. Although the Government owns the static test stands and in many cases owns the plants in which the manufacture is done, there is a certain problem about using those same facilities with any other manufacturer. If this is located, for example, in the plant of company A, company B has some difficulty coming in and using these facilities.

So, a decision was made that we would not build the assembly facilities for these large boosters at the plants of any specific manufacturers, nor would we build the static test stands on the plants of a specific manufacturer, but we would retain these as Government facilities. So,

in Michoud, for example, both Boeing and Chrysler will be assigned space for assembly operations. If at any time we want to cancel those contracts and get somebody else to do it, there is no embarrassment about bringing them into the same plant.

Mr. THOMAS. We have to get title to the land first.

Dr. DRYDEN. The same way with static test facilities at the Mississippi test site. They will be Government owned. They will not be annexed with a specific engine manufacturer or vehicle manufacturer.

ADVANCED SATURN STAGE TEST FACILITIES

Mr. THOMAS. Put pages CF12–A3, 4, 5, and 7 in the record.

(The pages referred to follow:)

ADVANCED SATURN STAGE TEST FACILITIES, MISSISSIPPI TEST FACULTY

DESCRIPTION

This project includes the test stands, data acquisition system, control systems, and other technical facilities required to perform acceptance static tests of the first stage of the ADVANCED SATURN vehicle. The first stage will develop 7,500,000 pounds of thrust, utilizing five F–1 engines. This static test facility complex will be one of several to be incorporated into the overall site.

Based on present development and production schedules, it will be necessary to construct one static test position and start construction on a second test position with fiscal year 1963 funds. Funds for completion of the second position will be included in the fiscal year 1964 program.

The fiscal year 1963 funding request is estimated to be approximately 40 percent of the total cost of the ADVANCED SATURN stage test facilities. The cost estimates and the description of facilities in this writeup are tentative pending the completion of additional engineering studies.

The scope of work includes:

(*a*) *Static test position.*—The test positions will be designed to mount the booster firing vertically downward into a water-film-cooled jet deflector. Provision will be made at the test position for booster handling equipment, on-stand propellent supply system piping, on-stand deflector cooling and fire protection water piping, personnel, and freight elevators, on-stand instrumentation and control wiring, termination rooms, ducting, and special equipment.

(*b*) *Instrumentation and control center.*—This facility will serve the first test position and the additional test position to be completed in the fiscal year 1964. The structure will be a blast-resistant design. It will house the analog or "quick look" data acquisition equipment, the control rooms with associated control equipment, briefing rooms, maintenance shops, and building equipment rooms.

(*c*) *Test support building.*—The test position and the control center will require a support building constructed of metal insulated panels and concrete floors on grade. Building utility services, equipment, and other features will be installed to provide protection from test-induced vibration forces.

(*d*) *Observation bunkers.*—Blast-protected observation posts will be constructed sufficiently close in to the stand to permit direct viewing of tests from several points in addition to the control center.

(*e*) *High pressure water system.*—Water storage capacity for 12 million gallons, approximately 2 miles of high pressure water distribution system, and a 500,000 gallons per minute pumping capacity will be provided.

(*f*) *Propellant ready storage and handling facilities.*—This item will include insulated liquid oxygen storage vessels having sufficient total capacity to fill the booster tanks with allowance for boiloff and emergencies, underground fuel storage tanks, high volume pumping systems, and associated piping and equipment. The equipment will be located adjacent to the test stand to permit direct pumping into the booster tanks from storage.

(*g*) *High-pressure gas storage.*—High-pressure gases will be stored in tanks located near the test stand. The storage tanks will be filled from the area networks and will be connected directly to the stand through underground lines.

(*h*) *Instrumentation and control.*—Transducers, sensors, recording instrumentation, and analog and digital computers will be required. Both types of com-

puters will receive and record data produced during the stage tests. Control systems will include remote television surveillance equipment, and audible and visual warning systems to provide continuous area control of personnel, vehicles, and equipment at the test area.

JUSTIFICATION

The facilities requested in this project are required for acceptance static testing of the first-stage boosters of the ADVANCED SATURN vehicle which will be manufactured at the Michoud plant, New Orleans, La. The static testing will determine the reliability of the booster for acceptance and use in early unmanned flights and more particularly in later manned flights. Static test facilities for these large boosters are required in time to meet production schedules. The on-stand time per booster will average about 6 weeks. Planned flight schedules in the ADVANCED SATURN program indicate the need for starting the construction of these facilities at the earliest possible date.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$1,100,000
Grading	$250,000	
Foundation excavations	[1] 200,000	
Waterway extension	415,000	
Roads	37,500	
Hardstands	150,000	
Electrical substation	47,500	
C. Facility construction and modifications		15,440,000
1st test stand	$5,980,000	
1st test stand deflector	1,500,000	
2d test stand foundation	1,120,000	
Control center (30,000 square feet, at $53 per square foot)	1,600,000	
Test support building (6,000 square feet, at $20 per square foot)	120,000	
Observation bunkers; 2 each (64 square feet, at $156 per square foot)	20,000	
Water storage tanks	1,000,000	
Propellant storage tanks	2,000,000	
Gas storage tanks	2,100,000	
D. Equipment, instrumentation, and support systems		15,800,000
Recording instrumentation	$3,000,000	
Analog and digital systems	4,000,000	
Vehicle adaption hardware	2,400,000	
High-pressure water pumps and distribution system	3,800,000	
Propellant transfer system	1,600,000	
High-pressure gas transfer system	1,000,000	
E. Design and engineering services		[2] 3,660,000
Total estimated cost		36,000,000

[1] An additional $500,000 for foundation excavations has been allocated from fiscal year 1962 funds.
[2] An additional $1,000,000 for design and engineering services has been allocated from fiscal year 1962 funds.

TOTAL COST OF MISSISSIPPI TEST FACILITY

Mr. THOMAS. The big costs here seem to be broken down between facility construction and modifications, and equipment, around $31 million. Is this a wrap-up cost here, gentlemen?

Mr. HOLMES. No, sir; these are not wrap-up costs.

Mr. THOMAS. Is it 30 or 40 percent of the total cost?

Mr. HOLMES. The total Mississippi facility would be about $300 million.

Mr. THOMAS. You set out here 40 percent.

Mr. HOLMES. That refers to the ADVANCED SATURN test stands. The total facility is closer to 30 percent.

Mr. THOMAS. What is the wrap-up cost?

Mr. HOLMES. Approximately $307 million.

Mr. THOMAS. This is about 30 percent of the cost, rather than 40 percent?

Mr. HOLMES. Yes.

Mr. THOMAS. How firm are these figures now?

Mr. HOLMES. They are certainly as firm as we can make them.

Mr. THOMAS. Are these inhouse figures, or have you had competitive bids on them?

Mr. HOLMES. These are inhouse figures. We have not gone to competitive bids.

Dr. DRYDEN. There is a statement in here, Mr. Thomas, which you probably saw:

> The cost estimates and the description of facilities in this writeup are tentative pending completion of additional engineering studies.

They are not based on engineering studies.

UTILITY INSTALLATIONS AND SUPPORT FACILITIES

Mr. THOMAS. Put in the record pages CF12-C1 and C2, and also C5, C6, and C7.

(The pages referred to follow:)

UTILITY INSTALLATIONS AND SUPPORT FACILITIES, MISSISSIPPI TEST FACILITY

DESCRIPTION

The Mississippi test facility is being developed to perform acceptance static and component testing on the ADVANCED SATURN vehicle first stage, and on the NOVA first and second stages. The cost estimates and the description of facilities presented in this writeup are tentative and cannot be finalized pending the completion of additional engineering studies. The support facilities described in this project are not related to any one test program, but are common support items to all test complexes that are being programed for the Mississippi test facility. It is estimated that the funds requested in this fiscal year 1963 project comprise approximately 30 percent of the total cost of anticipated support facilities. The scope of work for this project includes:

(*a*) *Office and administration building.*—Approximately 20,000 square feet of fully air-conditioned space will be required at this time. The building will be located outside of the explosive and hazard area of the test stand complexes.

(*b*) *Data acquisition and reduction center.*—It is proposed to construct a building with approximately 100,000 square feet area for the installation of the recording and computing equipment. The building will be air conditioned with humidity control. It will provide a centralized data collection and computation facility for all test operations.

(*c*) *Test area control center.*—This item covers the construction of approximately 20,000 square feet of building area for the installation of equipment. The center will provide complete control of all safety, service, and support items through communications, video, and special systems. It will be the centralized point of control for the test operations being conducted concurrently at the separate test complexes.

(*d*) *Maintenance and supply facilities.*—Four separate structures will be required; a maintenance building of approximately 24,000 square feet to provide office, shop, and warehouse space; two supply buildings of 4,000 and 5,000 square feet each; and 7,000 square feet of space for equipment shops.

(*e*) *Roads, railroads, utilities, and other support items.*—These items include the potable water supply treatment and distribution system, electrical distribution systems, sanitary and storm water collection and treatment system, road networks; State highway relocation; parking areas, railroads and unloading platforms, guardhouses, natural gas pumping and distribution systems, and a heating and air-conditioning plant.

(*f*) *Industrial water system.*—The installation of an industrial water system will be required to support the test complexes. The system will consist of res-

ervoirs, treatment facilities, high-pressure pumping systems, and distribution systems.

(*g*) *Docks.*—This item will include special docks, hoists, and controlled winches for unloading the space vehicle boosters from the transport barges.

(*h*) *Waterways.*—This item will include the necessary dredging and snagging required to make the Pearl River navigable and the construction of new canals (and perhaps locks) from the Pearl River to the first test complex.

JUSTIFICATION

The vehicle stages and boosters for the ADVANCED SATURN and NOVA vehicles will be manufactured and tested by various contractors. At the Mississippi test facility where their products will be tested for acceptance, the contractors will require engineering and administrative office space, data collection and computation facilities, test preparation facilities, and test-stand support shops. In addition each test complex will require large industrial water supplies, high pressure gases and air, and backup or main propellant storage facilities. These facilities will not be located at the stage test complexes due to the hazards and necessity for blast and acoustic protective construction. The centralization of these facilities will materially reduce overall construction costs and will increase efficiency in the use of the facilities. The roads, utilities, waterways, docks, maintenance and supply facilities, etc., are items normally required for the activation of any industrial type facility in a virgin area.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
A. Land acquisition		
B. Site development and utility installations	$1,140,000	$5,542,000
Roads (5 miles)	540,000	
Roads (14.4 miles)		1,440,000
River dredging	200,000	
Vehicle parking		60,000
Railroads (18 miles)		1,350,000
Unloading docks		150,000
Potable water wells, filters, settling tanks, and distribution		450,000
Electrical substations, switching stations, switch gear and distribution		992,000
Natural gas distribution	400,000	
Sanitary sewer installation		100,000
Canal or waterway (5 miles)		500,000
Lock foundations		500,000
C. Facility construction and modifications	536,800	5,918,000
Office and administration building (35,500 square feet; 14,600 in 1962 and 20,900 in 1963 at $24 per square foot)	350,000	500,000
Data acquisition and reduction center (building only) (100,000 square feet at $26 per square foot)		2,600,000
Test area control center (20,000 square feet at $50 per square foot)		1,000,000
Maintenance and supply facilities supply building (5,000 square feet, at $8 per square foot)		40,000
Segregated supply building (4,000 square feet, at $8 per square foot)		32,000
Equipment building (7,000 square feet, at $16.60 per square foot)		116,000
Maintenance building (24,000 square feet, at $13 per square foot)		312,000
Fire station (2,000 square feet, at $15 per square foot)	30,000	
Dock		400,000
Industrial water pumphouse (20,000 square feet, at $10 per square foot)		200,000
Electrical control house (800 square feet, at $10 per square foot)		8,000
Central heating plant (11,200 square feet, at $14 per square foot)	156,800	
Sewage treatment plant (5,000 square feet, at $12 per square foot)		60,000
Water storage tanks		650,000
D. Equipment, instrumentation, and support systems	663,200	640,000
Industrial water pumphouse equipment		200,000
Central heating and cooling plant equipment	643,200	
Sewage treatment plant equipment		440,000
Fire station equipment	20,000	
E. Design and engineering services	1,390,000	1,400,000
Total estimated cost	3,730,000	13,500,000

Mr. THOMAS. What about these utility installations?

Mr. HOLMES. This project provides for the general initiation of the utilities at that site including roads, vehicle parking, an office building, a data acquisition and reduction center, and a test area control center.

Mr. THOMAS. What about the costs here? How firm is this?

Mr. HOLMES. These also are preliminary enginering estimates. Detailed architect-engineering design work is not complete, although it is underway now.

NOVA STAGE TEST FACILITIES

Mr. THOMAS. Put in the record NOVA stage test facilities, page CF12–B1–2 and CF12–B5; $43 million.

(The pages referred to follow:)

NOVA STAGE TEST FACILITIES, MISSISSIPPI TEST FACILITY

DESCRIPTION

This project provides for the major portion of the design and for the initiation of site development, construction of test stand, installation of data acquisition and control systems, and other technical facilities required to perform acceptance and research and development static tests of the NOVA first- and second-stage vehicle.

The cost estimates and the description of facilities presented in this project are tentative at this time and cannot be finalized until additional engineering studies are completed. It is estimated that the cost of the items included in the fiscal year 1963 request comprise approximately 25 percent of the total cost of the facilities that ultimately will be required.

The NOVA first and second stages will be tested in separate areas or complexes; the fiscal year 1963 request for each test complex contains the following:

(*a*) *Static test position.*—The test position will be designed to mount the booster firing vertically downward into a water-film cooled jet deflector. Provision will be made at the test position for booster handling equipment, onstand propellant supply system piping, onstand deflector cooling and fire protection water piping, personnel and freight elevators, onstand instrumentation and control wiring, termination rooms, ducting, and special equipment.

(*b*) *Instrumentation and control center.*—This facility will serve the test position provided by this project, with growth potential to serve the additional test positions to be included in the fiscal year 1964 budget. The structure will be of blast-resistant design. It will house the analog or "quick-look" data acquisition equipment or other instrumentation equipment requiring relatively short transmission distance from the test stand, the control rooms with associated control equipment, briefing rooms, maintenance shops, and building equipment rooms.

(*c*) *Propellant facilities.*—This item will include insulated liquid oxygen storage vessels having sufficient total capacity to fill the booster tanks with allowance for boil-off and emergencies, and underground fuel storage tanks. The equipment will be located adjacent to the test stand to permit direct pumping into the booster tanks from storage.

(*d*) *Observation bunkers.*—Heavily blast protected test observation posts will be constructed sufficiently close in to the stand to permit direct viewing of tests from several points in addition to the control center.

Other support facilities such as high-pressure water systems, test buildings, high-pressure gas systems, etc., will be requested in the fiscal year 1964 budget to complete the test complexes.

JUSTIFICATION

The first stage of the NOVA vehicle will develop 12 million pounds of thrust, utilizing eight F–1 engines. Based on present schedules, it will be necessary to construct two test positions, one for development testing to be funded in the fiscal year 1963 and one for production acceptance testing to be funded in the fiscal year 1964. The second stage of the NOVA vehicle will develop 4 million

pounds of thrust, utilizing four M–1 engines. Based on present schedules, it will be necessary to construct two static test positions, one for development testing to be funded in the fiscal year 1963 and one for production acceptance testing to be funded in the fiscal year 1964. One additional position capable of handling either a first or second stage will be constructed as a backup.

This project is required to provide the facilities for research and development, and for acceptance testing of the first and second stages of the NOVA vehicle. The static testing of the contractor produced boosters is essential to determine their reliability for acceptance and use in early unmanned flights and in later manned flights. Static test facilities for these large boosters must be constructed in time to meet production schedules which have been keyed to flight schedules.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$1,240,000
Site prepartion	$190,000	
Excavation	200,000	
Waterway extensions	112,500	
New roads	75,000	
Hardstands	230,000	
Widen and improve existing roads	337,500	
Electric substations	95,000	
C. Facility construction and modifications		18,160,000
1st-stage test stand	7,340,000	
1st-stage test stand deflector	1,840,000	
2d-stage test stand	4,908,000	
2d-stage test stand deflector	1,232,000	
Control centers; 2 each (30,000 square feet at $47 per square foot)	2,800,000	
Observation bunkers; 4 each (64 square feet at $156 per square foot)	40,000	
D. Equipment, instrumentation, and support systems		15,100,000
Recording instrumentation	4,300,000	
Analog to digital system	4,200,000	
Control systems	3,600,000	
Propellant systems	3,000,000	
E. Design and engineering services		[1] 8,500,000
Total estimated cost		43,000,000

[1] An additional $1,360,000 for design and engineering services has been allocated from fiscal year 1962 funds.

Nuclear Rocket Development Station

Mr. Thomas. Let us take a look at CF13–A1, nuclear rocket development station in Nevada.

(The page referred to follows:)

Nuclear rocket development station—summary of estimate for 1963

Stage static test and maintenance facilities	$20,205,000
Stage demating, maintenance, and disassembly facilities	8,660,000
Radiation effects facility	7,125,000
Components test facilities	1,885,000
Support facilities	2,125,000
Total	40,000,000

Mr. Thomas. What is the nature of this project?

Mr. Finger. This is where the engine and stage development work will be done on nuclear rocket systems. This is out at the Nevada test site.

Mr. Thomas. This is a joint project with the AEC?

Mr. FINGER. Yes, sir; at Jackass Flats.

Mr. THOMAS. How does this tie in with Dr. Silverstein's reactor?

Mr. FINGER. Lewis, of course, does research related to these systems. Lewis is not involved in the actual development work which is being done here, although we are relying on them for technical support, advice, and consultation. They are doing basic materials work.

Mr. THOMAS. Do you need them both? That is what I am geting at.

Mr. FINGER. Yes, sir. This is the actual development.

Mr. THOMAS. This will be a test site. Somebody already has made something before it ever gets out there.

Mr. FINGER. That is correct.

Mr. THOMAS. Do you have a laboratory out there?

Dr. DRYDEN. No.

Mr. THOMAS. Atomic Energy has two or three.

Mr. FINGER. These are not research installations. These are test grounds, test facilities, to which we bring nuclear rocket components which have been developed and actually prooftest them in order to develop them. This is the only place we will run these nuclear rockets reactors hot as fissioning systems. It is the only location at which hot tests will be run on the engines and the stages as well as the basic reactors. Los Alamos does its development testing here on the reactor itself.

STAGE STATIC TEST AND MAINTENANCE FACILITIES

Mr. THOMAS. Let us put in the record pages CF13–A3 and A13, which seems to wrap it up.

(The pages referred to follow:)

STAGE STATIC TEST AND MAINTENANCE FACILITIES, NUCLEAR ROCKET DEVELOPMENT STATION

DESCRIPTION

Because of the radiation considerations associated with the nuclear stage, all testing involving nuclear power must be performed at a remote site. The Nuclear Rocket Development Station at Jackass Flats, Nev., has been selected as that site. Existing facilities at the site are capable of testing and handling nuclear engines, but not full stages. Therefore, there is the requirement for a facilities complex capable of supporting and performing static testing of the complete nuclear stage.

The design of the facility complex is based on the dispersal philosophy for reactor tests whereby separation of facilities is utilized to achieve radiation and explosion safety and minimum shielding. In the interests of maximum test stand utilization and test program flexibility, it is planned to incorporate the mobile concept where the stage will be initially erected on a test dolly and thereafter transported, fired, and serviced on the dolly. Special wide-gage trackage will be provided interconnecting all facilities to which the complete stage must be taken during various phases of the test cycle.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$2,345,000
Site preparation	$120,000	
Paving	90,000	
Railroad trackage	50,000	
Remotely controlled double trackage turntable	635,000	
Remote control switches	50,000	
Water line extensions	750,000	
Power line extensions and substations	650,000	
C. Facility construction and modifications		3,380,000
Test stand and blast pit	$654,000	
Deflector	450,000	
Control center (22,400 square feet at $50 per square foot)	1,120,000	
Stage assembly and maintenance building (22,000 square feet at $53 per square foot)	1,156,000	
D. Equipment, instrumentation, and support systems		11,980,000
Stage cars	$280,000	
Gantry	1,200,000	
Shop equipment	1,500,000	
Special jigs and fixtures	350,000	
Cryogenic gas storage	800,000	
Cryogenic gas piping system	600,000	
Cryogenic valves, consoles, and remotely controlled connections	500,000	
High-pressure gas storage and piping	350,000	
Safety systems	600,000	
Programers	1,000,000	
Cabling multiplexing	900,000	
Recorders, alarms, and consoles	370,000	
Readout equipment	2,400,000	
Communications systems	130,000	
Facility instrumentation	750,000	
Facility controls	250,000	
E. Design and engineering services		2,500,000
Total estimated cost		20,205,000

Mr. THOMAS. The big item here is equipment. How many gantries will you have to have?

Mr. FINGER. The first installation is for the first vehicle stage test stand, which will also double as an engine test facility.

Mr. THOMAS. How many of those test stands will you have?

Mr. FINGER. This pays for only one of the stage test stands. There will be two engine stands. Then in later years we expect that we will need two more stage stands.

TOTAL COST OF FACILITY

Mr. THOMAS. What will the ultimate cost figure be here?

Mr. FINGER. There probably will have to be another $60 million to complete all the installations that we expect will be required out of this test facility.

Mr. THOMAS. In addition to the $40 million?

Mr. FINGER. In addition to the $40 million.

Dr. DRYDEN. That is required at the site, but they are not in any sense a part of this facility.

Mr. FINGER. No, sir. The costs shown here are for the complete facility items shown. That is, the full stage stand is funded here—its control room and everything else.

Mr. THOMAS. You have there activities which will be financed separate and distinct from this? Is that what you are saying?

Mr. FINGER. Yes, sir, additional test stands.

STAGE DEMATING, MAINTENANCE, AND DISASSEMBLY FACILITIES

Mr. THOMAS. Put pages CF13–B1, 2, and 7 in the record.

(The pages referred to follow:)

STAGE DEMATING, MAINTENANCE, AND DISASSEMBLY FACILITIES, NUCLEAR ROCKET DEVELOPMENT STATION

DESCRIPTION

Facilities are required that will permit (*a*) the mating and demating of radioactive engines with the vehicles; (*b*) maintenance and disassembly of radioactive engines and engine components; (*c*) cooldown of stage and movable test equipment after a hot engine has been demated; and (*d*) minor hot maintenance which must be done by remote means but which would not necessitate demating and removal of the engine to the engine maintenance and disassembly building.

The mating and demating area will be equipped to disconnect remotely (or reconnect) a radioactive nuclear engine from the nuclear vehicle. The cooldown area will be an area served by the trackage system, with minimal shelter, which will serve as a holding position for radioactive decay of the complete stage and transport dolly. Provisions will be included for radiation monitoring, personnel control, and nuclear safety.

The demating facility will be a low-height, U-shaped, shielded building, with shielded viewing windows equipped for remote manipulation. Capability will also be provided for hardware and facility decontamination and contamination control. The functions to be provided here are engine and stage mating and demating, engine transfer to and from its transporter, and minor "hot" maintenance which can be performed on location.

A large, thick-walled concrete disassembly bay will be added to the engine maintenance and disassembly building to permit the maintenance and disassembly of radioactive rocket engines used in the vehicle program. Upon completion of a test, the nuclear rocket engine will be separated from the vehicle and brought into the additional bay of the building and positioned in a special disassembly jig. These operations will be performed by remotely operated equipment because the highly radioactive engines will preclude any contact maintenance or disassembly work. Both "hot" bays will be used as required for vehicle engines. In order to improve the efficiency of operations and permit vehicle engine disassembly in the total facility it will be necessary to add shielding windows and remote handling equipment to the "hot" bay being built with current funds.

Most of the major maintenance work will be performed in the new large bay, which will be equipped with manipulators and remotely controlled turntables. The walls and roof of the large bay will be constructed of reinforced concrete varying in thickness from 5 to 2 feet. The maintenance and disassembly operations will be viewed through oil-filled leaded glass windows designed to protect operating personnel from excessive radiation.

In addition to the large disassembly bay, a limited number of "hot" and "warm" cells will be provided for the disassembly and close inspection of radioactive components. These cells will be relatively small in size, constructed of thick concrete walls with lead glass windows to provide shielding, and equipped with remote manipulators.

A limited number of laboratories and offices will also be provided to complete a facility capable of efficiently performing all of the tasks associated with the maintenance, disassembly, and inspection of radioactive hardware associated with a nuclear rocket program.

Provision will be made for safe storage or disposal of radioactive waste materials. Necessary additions to the railroad system are included in the project.

JUSTIFICATION

There are no existing facilities at the station capable of remotely disconnecting a "hot" nuclear engine from a stage of the physical size of the nuclear stage. Since the stages are to be recycled, provisions must be made for holding the stage in a monitored area for cooldown and decontamination to allow contact maintenance to be performed within a reasonable period of time after the "hot" nuclear engine has been demated from the stage. The new stage demating facility will allow this function to be carried out.

The "hot" engines when demated from the vehicles will be maintained or disassembled as required in the engine maintenance and disassembly building; additions to this building are required to prevent delays in the program.

The total engine maintenance and disassembly facility to accommodate the NERVA and RIFT programs aiming at a flight date in the 1966–67 time period requires the addition of the items included in this project. They are the minimum requirements to accommodate the program on schedule. The second large disassembly bay is required to handle the engines that will be utilized in the RIFT vehicle development program. These engines will be accommodated in the engine maintenance and disassembly building. Severe traffic problems will be created in this building if the additional bay is not available when the RIFT vehicle testing program begins. The disassembly bay must be started in fiscal year 1963 so that the massive concrete structure can be completed in time to be used in the program.

Funds are requested for a minimum of equipment in the new "hot" bay to accommodate only the early phases of the vehicle program. Provisions will be made in the design for the addition of more shielding windows, manipulators, and other equipment if required at a later date.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$465,000
Site preparation	$40,000	
Paving	20,000	
Waterline extension distribution	35,000	
Waterline and substations	140,000	
Railroad trackage and switching	40,000	
Railroad turntable	190,000	
C. Facility construction and modifications		4,500,000
Hot maintenance bay addition; shielded (26,000 square feet at $90 per square foot)	$2,340,000	
Hot cell addition; shielded (8,300 square feet at $100 per square foot)	830,000	
Office addition (4,800 square feet at $25 per square foot)	120,000	
Stage demating facility (8,100 square feet at $150 per square foot)	1,210,000	
D. Equipment, instrumentation, and support systems		3,035,000
Overhead manipulator	$400,000	
Special tools, jigs, and fixtures	650,000	
Special radiation shielding	500,000	
Operation and maintenance equipment and machine tools	300,000	
Hot cell furnishings	250,000	
Remote controls	300,000	
Remote control manipulators	280,000	
Radiation instrumentation and monitoring equipment	300,000	
High-pressure gas storage system	10,000	
Communication systems	45,000	
E. Design and engineering services		660,000
Total estimated cost		8,660,000

Mr. THOMAS. What about the second item, B1, "Stage demating, maintenance, and disassembly facilities," $8.6 million? What is this?

Mr. FINGER. This is a facility in which we will remove the engine from the stage after being tested. These systems are radioactively hot, and they have to be worked on remotely with remote manipulators. The stage has to be moved into a building. The engine then is removed from it.

Mr. THOMAS. Are you going to put it in that big concrete bin and have those arms working on it?

Mr. FINGER. That is correct. This provides for one large concrete bay as well as some hot cells and stage separation facilities. All is done remotely, that is correct.

Mr. THOMAS. How thick will the wall be?

Mr. FINGER. Six feet of concrete.

Mr. THOMAS. How many arms will you have in there?

Mr. FINGER. This provides for one large overhead positioning system and two long-reach arms from the sides in the main bay. There will in addition be smaller arms for the hot cells that are included in this item. Eight hot cells are included here.

Mr. THOMAS. Gentlemen, this construction is very expensive, $100 a square foot.

Mr. THOMAS. The walls will be how thick?

Mr. FINGER. Six feet thick. The room will be 70 feet high. The windows are 6-foot-thick windows as well, filled with a boron compound to absorb any radiation that comes from the cell. Those are expensive windows, too.

Mr. EVINS. It would make a pretty good prototype of a bomb shelter.

Mr. FINGER. It would be a very fine fallout shelter. This does not provide windows for all the locations in which we have spotted possible windows.

RADIATION EFFECTS FACILITY

Mr. THOMAS. Let us see what the radiation effects facility is on page CF13–C1.

Mr. FINGER. That would be better called a component radiation development facility. It is a facility where we will put the hydrogen flow components of nuclear rocket engines but we will also have under a separate flow system the reactor that will be in the engine so we can simulate the radiation effects from that reactor.

Mr. THOMAS. Is this another hot laboratory?

Mr. FINGER. A hot nuclear reactor facility.

Mr. THOMAS. Insert that page, the justification and cost table on C6 and C7.

(The pages referred to follow:)

RADIATION EFFECTS FACILITY, NUCLEAR ROCKET DEVELOPMENT STATION

DESCRIPTION

A facility is required to evaluate the performance and to conduct development of the various nuclear rocket component systems operating in a radiation environment similar to that encountered in full power reactor operation. The facility will accommodate a full-scale flight-type nuclear rocket system excluding the reactor. A separately controlled, unshielded, test reactor using a separate flow system will be operated at low power for a long enough time to duplicate the total cumulative radiation effect on the engine components and assembled component systems that would result from operation at maximum design power level.

The radiation effects facility will consist of the following major components:

(*a*) *Buildings.*—A test stand constructed on a concrete foundation connected with the existing engine test stand No. 1 control point by a new access and cable tunnel. The test stand structure is required to support the test engine and control assembly and to provide connection terminals for remote control and instrumentation cabling. The building must also support the remote controlled reactor transport car and all reactor piping and cabling interface couplers. A tunnel between the facility and the control point is required for the protection of instrumentation and control cabling, personnel access, and general utility services. The existing control point will be enlarged to accommodate additional control consoles and data acquisition equipment.

(*b*) *Utility connections.*—Electric power is required for lighting, operating small shop tools, for miscellaneous services, and for instrumenttion and control operations during engine tests. Further studies may indicate the need of an emergency auxiliary power supply. Water service is required for emergency cooling of the reactor and for cleaning, decontamination washdown, and personnel uses between engine operating periods. After reactor operation and irradiation of the nuclear engine components, washdown with water hoses will be necessary to remove radioactive dust and debris prior to preparation for the next test operation. The radioactive wash water must be conducted to a suitable retention basin away from the facility by special drains and sewer system.

(*c*) *Site improvement, roads, and railroads.*—Access roads, parking areas, and railroad extensions will be constructed to provide access for personnel, material, and equipment to the site. The facility will be served by a remote-controlled locomotive that will remove the reactor car from the facility after a run to either an existing cool-down siding or to the maintenance and disassembly building currently under construction.

(*d*) *Instrumentation and controls.*—As the facility will be remotely operated from the control point, all control and indication circuits, as well as data transmission channels, must be run from the test stand location to the control point. Protected and shielded cabling will be used as required depending on the electrical characteristics of each circuit. Experience has shown that a minimum of 1,000 circuits will be necessary on the test equipment and test reactor operation, and 100 circuits for communication, paging alarms, and purge systems.

(*e*) *Coolant fluid system.*—The reactor, operating at low power, will be cooled by high-pressure gaseous nitrogen which must be stored and delivered in adequate quantities to insure safe reactor operation for the time required.

(*f*) *Cryogenic storage and piping.*—Liquid hydrogen will be supplied to the irradiated turbopump assembly at the pump capacity rate. This requires a new liquid hydrogen dewar and/or run tank, vacuum jacket piping, valves and controls. Also required are a liquid nitrogen system for precooling and a liquid oxygen system for the hot gas generator.

(*g*) *Hot gas generator.*—Hot gas under pressure is required to power the liquid hydrogen turbopump at its maximum output. This gas, to be supplied in the flight vehicle by either a separate unit or a reactor bleed system, will be supplied in the radiation effects facility by a separate burner system.

JUSTIFICATION

Because of the cost of each test of a full-scale flight-type nuclear engine, every effort must be made to examine the performance of all components and subsystems under conditions simulating as nearly as possible the environment and operating loads encountered in actual operation before running them in full engine tests. Failure of a major component such as a turbopump in a full engine test or in flight could be extremely costly to the program in both time and money. The radiation effects facility will enable a combination of mechanical and thermal loads and cumulative radiation effects to be imposed on the complete engine subassembly in a relatively safe and economical manner and thereby minimize the chance of a component failure during full power nuclear engine operation in an engine test stand or on the stage static test stand. Experience in complex vehicle development programs dictates that to insure successful completion of the program on schedule, proof of component reliability is essential.

Using this facility, a reactor operated independently of the components to be tested will provide a radiation environment similar to that to which the components will be subjected in the actual flight system. This will permit evaluation of the performance of the turbopump, controls, and instruments under full-load conditions independent of test reactor operation. The facility will not provide

for high-power reactor operation and will, therefore, not be equipped with a high-performance exhaust duct or cooling water system and all the cost and complexities inherent thereto.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$270,000
Drainage, grading, and compaction	$75,000	
Paving	30,000	
Railroad tracking and switching	5,000	
Waterline extension and valving	50,000	
Powerline extension and transformer	100,000	
Radioactive waste disposal sewer	10,000	
C. Facility construction and modifications		465,000
Superstructure and foundations	$100,000	
Access tunnel and forward control vault	250,000	
Control point expansion (2,000 square feet, at $50 per square foot)	100,000	
Cable terminal and switching vaults	15,000	
D. Equipment, instrumentation, and support systems		5,590,000
High pressure nitrogen coolant fluid storage system	2,400,000	
Piping and controls for nitrogen system	100,000	
Liquid hydrogen dewar, 250,000 gallons	400,000	
Liquid hydrogen piping	20,000	
Liquid hydrogen run tank	400,000	
Liquid nitrogen and liquid oxygen systems	50,000	
Hot gas generator	500,000	
Process piping	150,000	
Data acquisition and signal instrumentation channels	960,000	
Control circuit and communication channels	20,000	
Facility operation control systems including cryogenic valves, remote controlled connections, and consoles	490,000	
Communications systems	100,000	
E. Design and engineering services		800,000
Total estimated cost		7,125,000

Mr. THOMAS. What do you mean by a facility?

Mr. FINGER. A test stand to run rocket components.

Mr. THOMAS. It will be a stand?

Mr. FINGER. Yes, sir. A picture of it is shown on CF13–C4. The big difference between that stand and our other engine stands is that the reactor coolant will not be taken from the same source as the hydrogen pumped through the pumps, the turbine, and other hydrogen components. A failure in the hydrogen components will not——

Mr. THOMAS. It is a nonshielded test reactor using a separate flow system.

Mr. FINGER. That is correct.

Mr. THOMAS. What is the purpose of having both?

Mr. FINGER. In this system we will be developing the components, pumps, and turbines but the reactor will not be connected up with them as they would be in the engine test stands and the vehicle stands. This is to develop the hydrogen components themselves, not in a full system. This is something we have to do before putting them into the full engine system.

Dr. DRYDEN. The most significant statement is that a component can fail without wrecking the whole business.

If you had the complete engine, a failure of the pump or the turbine would wreck the whole reactor, engine, and everything else. This is a test stand for the pumps and turbines. They can fail independently.

Mr. THOMAS. The test stand apparently is the small item of construction. The big money is $5.5 million for equipment.

Dr. DRYDEN. That is right.

Mr. FINGER. We have considered nitrogen as the coolant. The nitrogen would be stored as a gas under high pressure but it involves large volumes. These, then, are large tanks which would be set up. That is the major cost of the facility—the storage of the coolant fluid to be used in the reactor.

Mr. THOMAS (reading):

Because of the cost of each test of a full-scale flight-type nuclear engine, every effort must be made to examine the performance of all components and subsystems under conditions stimulating as nearly as possible the environment and operating loads encountered in actual operation before running them in full engine tests. Failure of a major component such as a turbopump in a full engine test or in flight could be extremely costly to the program in both time and money.

That is what Dr. Dryden was saying. You can test the components and if you have a breakdown——

Mr. FINGER. The reactor would still be in good shape, and it is just that one component that fails.

METHOD AND NATURE OF ENGINE TESTING

Mr. THOMAS. What altitude will you reach in testing the reactor?

Mr. FINGER. In this facility there are no altitude facilities.

However, in the engine facilities we are using steam ejectors and we can get some vacuum conditions but not real altitude conditions, not high-altitude operations.

Mr. THOMAS. You will test them in that hot laboratory with 6- or 7-foot walls? Can you test them there?

Mr. FINGER. No, sir. These engines are taken there only to be disassembled and modified after they have been tested. They are removed from the stand and are disassembled and maintained in that heavily shielded building.

Mr. THOMAS. Are you going to test all types of engines? This is a second stage?

Mr. FINGER. The first engine we are working on will be flight tested as a second stage. It will be used, the plan is to provide an operational capability on that engine for a third stage on the ADVANCED SATURN.

Mr. THOMAS. How will you test it on the ground?

Mr. FINGER. It will be tested in test stands very similar to the chemical rocket test stands.

However, because of the radiation environment that it gives these will have to be shielded. We will have movable shields that will come around the engine and surround it so the radiation levels are low.

Mr. THOMAS. Are those shields movable? How thick will they be?

Mr. FINGER. The engine test stand shields will be about 2 or 3 feet.

There is a 3-foot ceiling which stands between the engine and the rest of the test stand in order to shield the test stand. This radiation coming out of the engine during an operation could activate the stand, so even when the engine is removed the stand still gives off radiation.

It is for that reason we have to shield the engines during tests.

It looks very much like a chemical rocket test stand. The extra precautions are required because of the radiation.

Mr. THOMAS. Where do you have the chemical rocket test stands?

Mr. FINGER. Marshall has some. Each of the contractors doing work on chemical rocket engines has his own development stands.

Mississippi will have test stands.

Mr. THOMAS. You have them all over the place.

Mr. FINGER. Edwards has some.

Mr. THOMAS. There are no harmful effects?

Mr. FINGER. Not from chemical systems, but the nuclear system, because of the radiation environment, must be done in remote locations.

Mr. THOMAS. The only problem at Marshall is explosions and noise.

Dr. DRYDEN. That is right.

Mr. THOMAS. You have a bear by the tail here in this nuclear engine. It is a different proposition altogether.

Mr. FINGER. It is. The testing rate on these stands will of necessity be lower because it takes a little time——

Mr. THOMAS. How effective will the testing stand be for this engine?

Mr. FINGER. We expect we will be able to run the engines enough to get two to three test runs on each stand a month. This is a lower testing rate from what is experienced in the chemical rocket practice. The reason for it is the radiation environment developed around the stand.

It takes longer before we can go in to make a change in the engine, and we have essentially to wait until the radiation levels go down before we remove the engine and put a new one in.

CAPACITY OF FACILITY

Mr. THOMAS. How big will that facility be?

Mr. FINGER. In what terms? In the thrust level it can take?

Mr. THOMAS. In square footage.

Mr. FINGER. The hot bay, the large disassembly building to which I referred earlier, is 50 by 100 feet, I believe.

Mr. THOMAS. I noticed that.

Dr. DRYDEN. He is talking about the test stand.

Mr. THOMAS. The test stand is made up of a dozen buildings.

Mr. FINGER. The radiation effects facility we are talking about now will be able to take a tank 30 feet in diameter, a propellant tank 30 feet in diameter.

Mr. THOMAS. In your maintenance facilities you have $20 million worth but you will have a dozen buildings mixed up in it.

Mr. FINGER. There will be a stand, control room, a warm assembly building.

Mr. THOMAS. Where you do the work will be a small building.

Mr. FINGER. It will be able to take a tank 30 feet in diameter. It will be a vertical stand 30 feet in diameter and about 100 feet high, and the entire stage will fit into that, propellant tank and engine.

COMPONENTS TEST FACILITIES

Mr. THOMAS. Insert pages CF 13–D1 and CF 13–D4 on the components test facilities, and CF 13–E1, CF 13–E2, and CF 13–E3 on "support facilities."

(The pages referred to follow:)

COMPONENTS TEST FACILITIES, NUCLEAR ROCKET DEVELOPMENT STATION

DESCRIPTION

Capability is required for conducting application approval and operational assurance testing of parts, components, and subsystems of the nuclear stage. Major features of the proposed components test facilities include component test cells, a cold flow test stand, instrumentation systems, a test control system, a control and operations center, cryogenic and high-pressure gas storage and distribution systems, and trackage interconnection to facilitate complete non-nuclear stage cold flow testing.

The test cells and test stand will provide test benches and multipurpose test positions including supporting equipment. Capability for component testing at cyrogenic temperatures will be provided. Adequate facilities will also be provided for testing and calibrating components, assemblies, and subsystems such as propellant feed systems, flow controllers, heat exchangers, valves, and pressurization systems.

The control and operations center will be part of the control center described under the project covering the stage static test and maintenance facilities. It will permit remote operation and control of the test setup. Provisions will be made for an operations office, and space for instrumentation and control cable distribution, patching and signal conditionings. The component test area will be protected by reinforced, blast-resistant concrete and will be equipped with alarms and fire protection control. Liquid hydrogen, high-pressure gases, and other services will be provided in the most economical manner consistent with safety, operational requirements, and economy. Trackage, paving, and utilities will be provided as required and integrated into the overall complex.

The instrumentation system will provide data channels, termination, and signal conditioning equipment, and patch panels integrated into the control center of the static test complex. Test controls, including communications and other special systems, will be provided to support the test stands and related systems.

JUSTIFICATION

The capability for component bench testing is required since individual components shipped to the station for assembly into the stage will require some acceptance inspection tests. Also, in the event of component malfunction, a quick means of bench testing or trouble shooting must be provided. This will minimize the delays that would be encountered in shipping the components back to the vendor for these types of tests.

The capability for cold-flow and tanking tests must be available at the station where the stages will be checked out after assembly, and prior to hot firing. This testing will be required since the stage and its components will be shipped into and assembled at the station. This type of cold-flow and tanking tests is a basic part of a stage development program.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$335,000
Waterline extension and distribution	$75,000	
Powerline extension and substation	130,000	
Site preparation	20,000	
Paving	10,000	
Railroad and turntables at facility	100,000	
C. Facility construction and modifications		250,000
Component test building (3,600 square feet, at $40 per square foot)	$144,000	
Cold-flow test facility (3,600 square feet, at $20 per square foot)	72,000	
Pads for cryogenic storage tanks (3,400 square feet at $10 per square foot)	34,000	
D. Equipment, instrumentation, and support systems		1,100,000
Equipment, tools, jigs, and fixtures	$130,000	
Controls and instrumentation for cryogenic systems	200,000	
Cryogenic storage and piping systems	650,000	
Instrumentation and controls	50,000	
Communication systems	70,000	
E. Design and engineering services		200,000
Total estimated cost		1,885,000

Support Facilities, Nuclear Rocket Development Station

DESCRIPTION

To operate the technical facilities which comprise the heart of the Nuclear Rocket Development Station, it will be necessary to provide adequate office space for technical and administrative personnel; facilities for the maintenance and calibration of instruments and controls; general shops, stockrooms, and storage space; and site developments such as extensions of roads, and water, electric, and communication systems. The major items included in this project are as follows:

(*a*) *Central services building.*—It is estimated that a minimum of 10,800 square feet of office space will be required in the early phases of the program. This building will be constructed of concrete block on a concrete-slab floor. It will be a single-story structure designed for expansion to accommodate all office personnel who will be associated with the NERVA and RIFT programs when they reach their peak strength.

(*b*) *Electromechanical laboratory.*—This laboratory will consist of one or more buildings of similar construction containing approximately 5,000 square feet for instrument and controls maintenance and calibration shops; 10,000 square feet for machine, sheetmetal, and general maintenance shops; and 4,000 square feet for shipping, receiving, and general stockroom services.

(*c*) *Decontamination system.*—A device containing special washdown equipment for cleansing engine parts and other parts which have been exposed to or have accumulated radioactive waste materials will be provided for general use of all contractors at the center. The device will probably be located near the engine maintenance and disassembly facility to take advantage of the existing radioactive waste disposal system.

(*d*) *Site development and extension of utilities.*—An extension of the railroad system is included to connect the engine maintenance and disassembly facilities to the vehicle testing facilities complex and to other supporting facilities where the engine carrier must provide service. Roads, utility systems, communications systems, and safety systems will be extended to the vehicle test complex and to the support facilities area.

JUSTIFICATION

Every effort will be made to utilize existing offsite facilities for machine shop and fabrication work. It is anticipated that most of the parts, ground-support equipment, and special test equipment will be fabricated elsewhere; however, modifications, repairs, and the fabrication of pieces of special equipment will have to be done onsite to avoid delays to the program. The remote location of the station (approximately 91 miles from Las Vegas) make it difficult to operate with efficiency unless a minimum of such facilities is provided. It will also be necessary to provide office space at the site for these technical and administrative employees whose full-time services are required at this location.

A minimum of facilities is included for the repair and maintenance of instrumentation and controls at each test complex. This is necessary to permit servicing equipment in place when difficulties are minor. In addition, a laboratory will be required where delicate and sensitive instrumentation can be maintained, repaired, and calibrated as near to the test position as practicable but sufficiently remote so as not to require expensive shielding to protect personnel and equipment.

To support these functions, a stockroom will be required to house and dispense the everyday materials needed in such an operation. The various testing complexes are separated by sufficient distances to permit operation of one complex without interference to the other. This is done to permit maximum utilization of the test stands. The complexes must be serviced with roads, railroad trackage, water, electricity, and communications.

Cost estimates

A. Land acquisition		
B. Site development and utility installations		$300,000
Roads and parking areas	$40,000	
Waterline extensions and distribution	120,000	
Electric powerline extensions and substation	160,000	
C. Facility construction and modifications		674,000
Central services building (10,800 sq. ft. at $30 per square foot)	$324,000	
Machine, sheet metal, and general maintenance shops (10,000 sq. ft. at $25 per square foot)	250,000	
Shipping, receiving, and general stockroom areas (4,000 sq. ft. at $25 per square foot)	100,000	
D. Equipment, instrumentation, and support systems		1,006,000
Tools and equipment for shops	$221,000	
Calibration and test equipment for electro-mechanical laboratory	515,000	
Decontamination system	50,000	
Communications and safety systems	220,000	
E. Design and engineering services		125,000
Total estimated cost		2,125,000

CONSTRUCTION OF FACILITIES, VARIOUS LOCATIONS

Mr. THOMAS. Insert CF14–A1 in the record.
(The page referred to follows:)

Construction of facilities—various locations—summary of estimates

Advanced antenna system, Goldstone station	$14,250,000
ADVANCED SATURN dynamic test facility	2,100,000
Antenna facility, Johannesburg station	5,000,000
Antenna facility, Woomera station	5,000,000
Data acquisition facility, Far East station	6,000,000
Data acquisition facility, Rosman station	3,500,000
Facilities for F–1 engine program	25,000,000
Facilities for J–2 engine program	4,000,000
Facilities for M–1 engine program	16,000,000
Manned space flight control centers	18,000,000
Space radiation effects laboratory	12,382,000
Nova stage manufacturing facilities	16,100,000
Total	127,332,000

Mr. THOMAS. You have the advanced antenna system Goldstone station, $14.2 million. You have the ADVANCED SATURN dynamic test facility for $2.1 million; the antenna facility at Johannesburg station, $5 million; the antenna facility at Woomera station, $5 million; the data acquisition facility, Far East station, $6 million; the data acquisition facility, Rosman station, $3.5 million; facilities for the F–1 engine program, $25 million; facilities for the J–2 engine program, $4 million; facilities for the M–1 engine program, $16 million; manned space flight control centers. $18 million; space radiation effects laboratory, $12 million; and NOVA stage manufacturing facilities, $16 million.

Insert pages CF14–A2–4 in the record.
(The pages referred to follow:)

ADVANCED ANTENNA SYSTEM, GOLDSTONE STATION, VARIOUS LOCATIONS

DESCRIPTION

This project involves the construction and installation of a superior ground antenna system, specifically designed for deep space vehicle tracking and communications. The new antenna will provide equal angle tracking accuracy and an 8 to 10 decibel increase in communication capability compared with the present antennas used at the deep space stations. This performance will represent a signficant advancement in the state of the art for ground antennas used in deep space mission communication, and will be achieved by a combination of larger aperture and lower noise feed system. The increase in communication capability over the current 85-foot antennas will allow eight times the amount of information to be received from a spacecraft.

In 1961, a competitive design feasibility study of the antenna was performed. The study demonstrated that the desired performance characteristics of the antenna can be achieved. The design program already funded will provide detailed design plans for antenna fabrication and erection. The antenna will be an azimuth-elevation mounted, low focal length to diameter ratio parabolic reflector, approximately 230 feet in diameter and utilizing a folded (Cassegrain) radiofrequency feed system. The new antenna must be a very precise instrument, since it will operate with high efficiency at the new space communication frequency band of 2,290–2,300 megacycles per second. Also the antenna will be able to track automatically to within a few degrees of the horizon.

The antenna will be erected at the Goldstone tracking station, 45 miles from Barstow, Calif. The Goldstone station, operated by the Jet Propulsion Laboratory, is located on Government property (Fort Irwin). The antenna system will consist of the following major elements:

A complete pedestal and steerable aperture reflector to provide continuous angular coverage of space vehicles to within a few degrees of local horizon.

A complete servodrive and control system for accurately and automatically positioning the aperture.

Precise digital devices for measurement and display of the angular position of the antenna.

Microwave components, including the primary feeds and transmission components suitable for either ultrahigh sensitivity receiving, high power (100 kilowatt) transmitting, automatic tracking and diplex operation.

Boresight optical equipment.

Fixtures and instrumentation for axes, structure alinement and testing.

Devices for personnel safety on and around mount.

Devices to protect antenna from damage in event of drive system failure.

Complete documentation of system including testing, operation, and maintenance procedures.

Certain site facilities are also included:

A prepared site for the antenna with access road.

Primary electrical power and communication service.

Air-conditioned control room with wiring troughs, electrical power, and control consoles. (Current planning indicates that location of the control room within the antenna pedestal may be feasible.)

Housing for antenna drive prime mover equipment.

JUSTIFICATION

A fundamental principle in the design of spacecraft systems is that to the greatest degree possible, complexity and sophisticated installations should be kept out of the vehicle and left on the earth. The space exploration missions in the 1965–75 period will require a spacecraft communications installation of great complexity, regardless of the ground antenna size and within the realm of what is now technically practical. High transmitter power and high antenna gain both must be used on the spacecraft to approach the communication system performance required by the missions. An 8 to 10 decibel greater

capability on the earth end of the communication link will always allow a worthwhile amplification either in amount of data transmitted, range of communication or fidelity, and in many cases will also allow a profitable weight reduction in the spacecraft.

Because an earth-based installation of this type will have an essentially indefinite useful life, its initial cost represents an investment which will be amortized over a very great number of individual missions.

The proposed antenna is a culmination of a 2-year intensive study and design program. A thorough coordination of all work in the large antenna area, both United States and foreign, has been effected to insure that the project will be technically successful in an economical fashion.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$900,000
Access roads	$140,000	
Water supply system and storage tank	50,000	
Septic tank and drain field	30,000	
Site grading and sealing	65,000	
Fuel oil storage and distribution system	15,000	
Power transmission line, distribution system, and substation	350,000	
Intersite and intrasite communication systems	50,000	
Standby diesel generators and transfer equipment	200,000	
C. Facility construction and modifications		11,870,000
Antenna foundation	$350,000	
Antenna structure and pedestal	4,200,000	
Antenna movement and drive system	7,070,000	
Servomechanical building (4,000 square feet at $37.50 per square foot)	150,000	
Collimation tower and housing	100,000	
D. Equipment, instrumentation, and support systems		1,240,000
Antenna feeds	$70,000	
Servosystem	200,000	
Antenna data system	300,000	
Reflector contour system	200,000	
Support systems (collimation, optical, intercommunications, boresight, and timing)	130,000	
Test equipment	340,000	
E. Design and engineering services: Systems engineering and documentation (an additional $750,000 has been allocated from fiscal year 1962 funds)		240,000
Total estimated cost		14,250,000

Mr. THOMAS. I show $750,000, design and engineering service. You have it at $240,000. Why is that?

Dr. DRYDEN. 1962 funds are added to it.

ADVANCED SATURN DYNAMIC TEST FACILITY

Mr. THOMAS. Insert 14–B1, ADVANCED SATURN test facility in the record.

(The page referred to follows:)

ADVANCED SATURN DYNAMIC TEST FACILITY, VARIOUS LOCATION

DESCRIPTION

This project requests the necessary funds to permit the design, construction, and installation of a dynamic test facility for the development of the ADVANCED SATURN vehicle. Major components of the facility will include a heavy reinforced concrete foundation, a 360-foot-high steel tower structure, a terminal building, and area roadways to accommodate vehicle transporters. The steel tower structure will house stairways, elevator, working platforms, wind protec-

tion, fire protection, vehicle support for free-flight conditions, lateral support, support for a heavy stiff-leg derrick, and an auxiliary hoist. A site location is to be selected.

JUSTIFICATION

The dynamic test stand is to be utilized in the conduct of mechanical and structural tests on large multistage space vehicles. A facility of this type is required for the checkout of mechanical mating features; the determination of natural frequencies and bending characteristics with various simulated propellant quantities, under static and simulated free-flight conditions; the determination of the structural effects of cycled gimbaling on the vehicle; and the adequacy of flight control.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installations		$70,000
C. Facility construction and modifications		1,550,000
Test stand	$1,500,000	
Terminal building	50,000	
D. Equipment, instrumentation, and support systems		300,000
Special equipment	$200,000	
Instrumentation	50,000	
Control systems	50,000	
E. Design and engineering services		180,000
Total estimated cost		2,100,000

ANTENNA FACILITIES—JOHANNESBURG AND WOOMERA STATIONS

Mr. THOMAS. Also insert CF14–CD 1 and 2.
(The pages referred to follow:)

ANTENNA FACILITY—JOHANNESBURG STATION, ANTENNA FACILITY—WOOMERA STATION, VARIOUS LOCATIONS

DESCRIPTION

Additional antenna facilitjes are required to enable the existing oversea deep space stations to handle the planned workload of the expanding lunar and planetary spacecraft programs. The two new antennas will supplement the currently installed oversea deep space facilities and to achieve the same spatial coverage, must be located at approximately the same longitudes. The present oversea deep space stations are located at Woomera, Australia, and Johannesburg, South Africa. Each of the new facilities will consist of a 85-foot-diameter paraboloidal antenna; drive and positioning device; receiving and servoelectronics; radio frequency feeds; and recording, data handling, and communications equipment. The project also includes the necessary technical and support buildings and utilities.

JUSTIFICATION

Beginning in the calendar year 1964, the increasing number of space flights in the lunar and planetary programs will result in requirements for tracking and data acquisition coverage which exceed the capacity of the present oversea deep space stations. By 1964, both stations will already be operating nearly three shifts, 7 days a week. The launching of two Venus missions and two Mars missions is proposed during the appropriate periods of planetary approach in 1964. These spacecraft will be in flight concurrently with the several lunar landing and lunar orbital missions also planned for 1964. The demands for full-time coverage of portions of individual missions, and the relative configurations of the lunar and planetary flight trajectories are such that, for extended periods of time, these concurrent missions cannot be adequately covered by a single antenna at a given deep space location. The two antennas requested under this project will provide the additional capacity to meet these increased requirements. Fiscal year 1963 funding is necessary to allow for suitable construction leadtime.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$970,000
Site preparation	$250,000	
Access and site roads	200,000	
Diesel generators	120,000	
Utility connections	250,000	
Communications installations	150,000	
C. Facility construction and modifications		980,000
Antenna and mount	$545,000	
Antenna installation and erection	200,000	
Collimation tower and housing	105,000	
Control building (1,200 square feet at $25 per square foot)	30,000	
Technical buildings (1,500 square feet at $25 per square foot)	37,500	
Support buildings (2,500 square feet at $25 per square foot)	62,500	
D. Equipment, instrumentation, and support systems		2,940,000
Servo hydraulics systems	$275,000	
Antenna data systems	365,000	
Antenna feeds	225,000	
Receiving systems	335,000	
Instrumentation and recording equipment	475,000	
Intrasite communication system	225,000	
Test equipment	335,000	
Support equipment (optical, boresite, time standards, and video)	170,000	
Antenna control consoles and displays	325,000	
Collimation system	110,000	
Intrasite cabling	100,000	
E. Design and engineering services		110,000
Total estimated cost (per station)		5,000,000
Total estimated cost		10,000,000

Mr. THOMAS. Is this the high altitude sheet?

Mr. BUCKLEY. These are duplicates.

Mr. THOMAS. The big high one is 210 feet and the other is 85?

Mr. BUCKLEY. That is right.

Mr. THOMAS. What are you going to do with that 210 feet? How many do you have here, six more?

Mr. BUCKLEY. There are four of 85 feet and two——

Mr. THOMAS. Off the record.

(Discussion held off the record.)

Mr. THOMAS. Insert 14–E1, 14–E2, and 14–E3.
(The pages referred to follow:)

DATA ACQUISITION FACILITY, FAR EAST STATION, VARIOUS LOCATIONS

DESCRIPTION

The construction and installation of a high-gain, wide-band data acquisition facility is required in the northern latitudes of the Far East.

The location of the facility will have to be essentially free of electromagnetic radiation interference and suitable for economical year-round access. The precise location will be the best compromise in providing a minimum of duplicate coverage with that of the Rosman, N.C., station considering factors of economy, logistics, and geopolitical problems. The area of the tract must be suitable for the installation of an 85-foot parabolic antenna, suitable buildings for operations, utilities, and logistics, and for future expansion as dictated by flight program requirements.

The antenna system will be an 85-foot parabolic, prime-focus-fed dish, with a provision for subsequent modification to Cassegrain feed to improve performance at single-frequency operation. The design characteristics will be more stringent than the 85-foot antennas presently in existence, which will permit suitable operation with little degradation in tracking and pointing accuracy up to frequencies of 10 kilomegacycles per second. The antenna mount will be of the N–Y type designed specifically for satellite tracking. The feds will provide autotracking capabilities at 136 and 400 megacycles per second, and the 1,700 and 2,290 megacycles per second bands. The servosystem and associated tracking electronics will permit antenna control in the following modes: automatically on satellite signals; manually; by precomputed teletype drive tapes; by slaving to another antenna for acquisition or programed search.

The electronics will include telemetry receivers for 136 and 400 megacycles per second and tracking receivers for 136 and 400 megacycles per second. Tape recorders for recording telemetry data and the necessary time standard for correlation of telemetry data with tracking data will be provided. General-purpose pulse code modulation (PCM) demodulating equipment, including a real-time data display, will permit the control of the large scientific satellites.

The physical facilities will include a 12,800-square-foot operations building, comprising 1,500 square feet for antenna operations and receiver area; 1,500 square feet for data recording and data reduction; 3,000 square feet of office, darkroom, and storage space; and 6,800 square feet for laboratories and utilities. A generator building of about 1,600 square feet will provide housing for four 240-kilovolt-ampere diesel generators, garage, and utilities. A 750-square-foot building will house the antenna hydraulic drive system. Some supporting facilities for the operating personnel may be required. Two collimation towers, with small transmitter buildings at the bases, will be located 1 to 5 miles from the 85-foot antenna. The project includes fencing, hard-surface roads, power, and intercommunications lines.

JUSTIFICATION

To meet the minimum program requirements of the large scientific satellites, data should be acquired from at least 60 percent of the spacecraft orbits. The facilities at Rosman, N.C., station, in conjunction with the facility proposed in this project, will permit the minimum program requirements to be met for such important satellites as the eccentric geophysical observatories and the orbiting astronomical observatories.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$402,000
Site and access road grading and paving	$100,000	
Diesel generators, including automatic transfer gear, split bus, dummy load, and fuel storage tank	220,000	
Electrical connections	23,000	
Water supply system and storage tank	20,000	
Septic tank and drain field	10,000	
Fencing	10,000	
Access and power to collimation towers	19,000	
C. Facility construction and modifications		1,538,000
Antenna foundation	$100,000	
Antenna, mount and installation	980,000	
Generator building (1,600 square feet, at $25 per square foot)	40,000	
Hydraulics building (750 square feet, at $20 per square foot)	15,000	
Operations building (12,800 square feet, at $30.50 per square foot)	393,000	
Collimation towers	10,000	
D. Equipment, instrumentation, and support systems		3,725,000
Antenna feeds (136, 400, 1,700, and 2,290 megacycles per second)	$110,000	
Tracking receivers	385,000	
Parametric amplifier system (400 megacycles per second)	80,000	
Telemetry receivers	510,000	
Recorders	240,000	
Antenna servosystem	375,000	
Antenna data system	435,000	
Command system	115,000	
Antenna	35,000	
Transmitter	40,000	
Consoles	40,000	
Support system	210,000	
Collimation system	104,000	
Optical system	68,000	
Intercom and telephone systems	20,000	
Time standard	18,000	
Electronics installation and checkout	335,000	
Test equipment and initial spares	245,000	
Diversity combiners	80,000	
Real-time data display	240,000	
General purpose PCM demodulators	365,000	
E. Design and engineering services		335,000
Total estimated cost		6,000,000

DATA ACQUISITION FACILITY—ROSMAN STATION

Mr. THOMAS. Insert CF14–F1 and F2 in the record.
(The pages referred to follow:)

DATA ACQUISITION FACILITY, ROSMAN STATION—VARIOUS LOCATIONS

DESCRIPTION

It is proposed to design, fabricate, and install an additional 85-foot parabolic antenna and associated electronics at the Rosman, N.C., Data Acquisition Facility.

The antenna system will be an 85-foot parabolic, prime-focus-fed dish, with a provision for subsequent modification to Cassegrain feed to improve performance at single frequency operation. The technical characteristics of the antenna surface will permit operation, with little degradation, up to frequencies of 10,000 megacycles per second. The antenna mount design will be of the X–Y type designed specifically for satellite tracking. The feeds will provide auto-tracking capabilities at 136, 400, and the 1,700 megacycles per second and 2,290 megacycles per second bands. The servosystem and associated tracking electronics will permit tracking automatically on satellite signals, manual tracking, tracking by teletype tape drive, slaving to another antenna for acquisition or programed modes of search for acquisition.

The electronics will include telemetry and tracking receivers for 136 and 400 megacycles per second, and suitable recorders to permit operation simultaneously with the prime data acquisition system.

The physical facilities will include the addition of about 6,000 square feet to the present operations building, a separate hydraulics building, and additional space in the present power generator building to house four 200-kilovolt-ampere diesel generators.

The necessary optics for collimation and electronic test equipment and critical spares will be included in the project.

JUSTIFICATION

The Rosman, N.C., station will be the primary U.S. data acquisition station for the large scientific satellites currently programed to start in the calendar year 1962. Initial funds for its construction were provided in the fiscal year 1962 construction program. To meet the program requirements of such large satellites as the eccentric geophysical observatories, the polar orbiting geophysical observatories, and the orbiting astronomical observatories would require that the Rosman facility be operated in excess of 24 hours per day during calendar year 1964 and later. To effectively handle this workload, a second antenna is required at the Rosman station.

Cost estimate

A. Land acquisition		----------
B. Site development and utility installations		$160,000
Diesel generators including automatic transfer gear, split bus, dummy load, and fuel storage tank	$160,000	
C. Facility construction and modifications		1,250,000
Antenna foundation	$100,000	
Antenna mount and installation	950,000	
Generator building addition (1,600 square feet at $18.50 per square foot)	30,000	
Hydraulics building (750 square feet at $20 per square foot)	15,000	
Operations building addition (6,000 square feet at $25.60 per square foot)	155,000	
D. Equipment, instrumentation, and support systems		2,005,000
Antenna feeds (136, 400, 1,700, 2,290 megacycles per second)	$100,000	
Tracking receivers	365,000	
Parametric amplifier system (400 megacycles per second)	75,000	
Telemetry receivers	230,000	
Diversity combiners	35,000	
Recorders	115,000	
Antenna servosystem	345,000	
Antenna data system	400,000	
Command antenna	30,000	
Optical system	65,000	
Intercom and telephone systems	20,000	
Test equipment and initial spares	125,000	
Electronics installation and checkout	100,000	
E. Design and engineering services		85,000
Total estimated cost		3,500,000

Mr. THOMAS. Insert 14 G1, G2, G4, G5, and G6.
(The pages referred to follow:)

FACILITIES FOR F–1 ENGINE PROGRAM, VARIOUS LOCATIONS

DESCRIPTION

This project consists of the construction at Edwards Air Force Base, Calif., of four single-position single-engine static test stands and associated control center, propellant, electrical, water, storage, and support facilities; the construction of facilities and the procurement of additional equipment required at the contractor's plants in Canoga Park, Calif., and Santa Susana, Calif., for the production of engines; and the facilities and equipment required at the three locations to support a continuing development program.

The initial increment of $16,775,000 provided for this project in the fiscal year 1962 appropriation funds the design and the initial increments of construction and equipment for three of the four stands at the Edwards Air Force Base ($13,620,000); the installation of facilities and equipment for development work at the Edwards Air Force Base ($2,022,000); the procurement of equipment for development work at Canoga Park ($670,000); and the design, facility modifications, and procurement of equipment for expansion of the liquid oxygen system at Santa Susana ($463,000).

The funding requested in the fiscal year 1963 budget will complete the entire project including construction of the fourth stand to be built on a site to be selected in proximity to the other three stands; $22,700,000 is requested for completing the construction of the four test stands and $2,300,000 for environmental, production, and tooling equipment at the contractor's Canoga Park plant for the production of engines and the support of a continuing development program.

JUSTIFICATION

Production testing facilities are required to meet the scheduled engine delivery requirements for the 1,500,000-pound-thrust kerosene-oxygen (F–1) engine. Four stands are required to provide three F–1 engine tests per month per stand.

The F–1 booster vehicle engine is the most powerful single-chamber engine under development. It will be used in the vehicles for the manned lunar landing mission, and for manned exploration of the space environment. The size of the F–1 engine and its components produces unique and specialized requirements for their fabrication and testing. The required size of engine test stands, components test stands, support systems, and utilities for F–1 engine acceptance testing precludes the modification of existing test facilities.

In addition to F–1 engine acceptance test stands, laboratory, environmental, production, and tooling equipment is required at the contractor's plant. This equipment is necessary to expedite and simplify the manufacturing, inspection, and testing of F–1 engine components.

Cost estimate

	Fiscal year 1962	Fiscal year 1963
Acceptance static test facility, flight research center (Edwards Air Force Base):		
A. Land acquisition		
B. Site development and utility installations	$2,400,000	$500,000
Clearing brush	20,000	
Core boring	80,000	
Excavation	450,000	250,000
Site grading	450,000	250,000
Roads	350,000	
Service area paving	150,000	
Utility installation (electrical)	400,000	
Utility installation (water)	500,000	
C. Facility construction and modifications	3,380,000	8,870,000
4 single position test stands and control center:		
Stand foundations	750,000	1,500,000
Stand superstructures	1,480,000	3,200,000
Flame deflector structures	500,000	1,000,000
Control center	400,000	200,000
Underground passageways	250,000	700,000
Electric support rooms; heat and blast proof, 4 each (1,200 square feet, at $166 per square foot)		800,000
Pretest buildings; 4 each (10,000 square feet, at $20 per square square foot)		800,000
Pumphouses; 2 each (1,800 square feet, at $12.50 per square foot)		45,000
Observation bunkers; blast proof, 8 each (84 square feet, at $149 per square foot)		100,000
Modifications to test stand 1-A for followon R. & D. program):		
Addition of environmental simulation capability		225,000
Addition of gimballing capability		300,000
D. Equipment, instrumentation, and support systems	7,040,000	9,605,000
Pressurizing systems	1,080,000	1,000,000
Fuel systems	1,650,000	3,730,000
Test stands instrumentation	2,100,000	2,300,000
Control room instrumentation	800,000	1,000,000
Electrical system	230,000	355,000
Fire protection and water system	780,000	
Miscellaneous	400,000	450,000
Water system		800,000
E. Design and engineering services	800,000	3,725,000
Total	13,620,000	22,700,000
Deepened existing R. & D. program, flight research center (Edwards Air Force Base):		
A. Land acquisition		
B. Site development and utility installations: Site preparation and erosion control, test stands 1-A and 1-B	12,000	
C. Facility construction and modifications: Construction of 2d position, test stand 2-A	380,000	
D. Equipment, instrumentation, and support systems	1,410,000	
Equipment	640,000	
Instrumentation	610,000	
Support systems	160,000	
E. Design and engineering services	220,000	
Total	2,022,000	
Development equipment, Canoga Park (Rocketdyne):		
A. Land acquisition		
B. Site development and utility installations		10,000
C. Facility construction and modifications: Brazing and assembly room; 50 feet high (3,600 square feet, at $55.50 per square foot)		200,000
D. Equipment, instrumentation, and support systems	670,000	2,080,000
Equipment	525,000	
Tooling		
Instrumentation	130,000	
Support systems	15,000	
E. Design and engineering services		10,000
Total	670,000	2,300,000

Cost estimate—Continued

	Fiscal year 1962	Fiscal year 1963
Liquid oxygen system expansion, Santa Susana Air Force Plant No. 56 (Rocketdyne):		
A. Land acquisition		
B. Site development and utility installations	$15,000	
Site preparation	5,000	
Utility connections	10,000	
C. Facility construction and modifications, facility modification	50,000	
D. Equipment, instrumentation, and support system	373,000	
Equipment	250,000	
Instrumentation	123,000	
E. Design and engineering services	25,000	
Total	463,000	
Total estimated cost	16,775,000	$25,000,000

Mr. THOMAS. Is this $16,775,000 the wrap-up cost?
Mr. DIXON. Yes, it is.
Dr. SEAMANS. This states it is the initial increment.
Mr. DIXON. $25 million wraps up the cost in 1962.
Dr. SEAMANS. No additional funds will be required in 1964.

FACILITIES FOR J–2 ENGINE PROGRAM

Mr. THOMAS. Insert 14H–1, 3, and 4 in the record.
(The pages referred to follow:)

FACILITIES FOR J–2 ENGINE PROGRAM, VARIOUS LOCATIONS

DESCRIPTION

This project consists of modifications to the two existing Delta 2 static test stands and to the Delta 3 static test stand located at the Government-owned contractor-operated (Rocketdyne) Propulsion Field Laboratory, Santa Susana, Calif.; and modifications of production and development test facilities at the same location. These facilities are required in the acceptance and development testing of the 200,000-pound-thrust hydrogen-oxygen (J–2) engine to be used in the manned lunar landing mission program. The existing test stand complexes previously used in the Air Force ATLAS program must be modified to accommodate new engine mounting structures, and oxidizer and liquid hydrogen propellant storage facilities and transfer lines.

The initial fiscal year 1962 increment of this project provided funds in the amount of $7,250,000 for modifications to two Delta 2 stands; and the initiation of the modification of facilities and the installation of equipment to support the development of the J–2 engine, including the testing of engine component hardware within a simulated operating environment (vacuum-temperature) of space.

The fiscal year 1963 budget request for $4 million will complete the construction requirements for facilities for the 200,000-pound-thrust engine program. It will provide for additional modifications to the Delta 3 stand; the modification and construction of production and development test facilities; and the acquisition of laboratory, production, and test equipment, instrumentation, and support.

JUSTIFICATION

The J–2 engine is a high-specific-impulse rocket engine which will be used as the second and third stages of the ADVANCED SATURN configuration, and as the third stage of the NOVA vehicle.

To meet flight dates with an engine of the reliability required for manned flight missions the facilities in this project are essential to support development and acceptance testing of the J–2 engines. During the fiscal year 1963 the

development effort will reach its peak and testing will progress at an accelerated rate to prove reliability and performance, and to detect and correct design and fabrication deficiencies. The J–2 engine delivery schedule requires a complete acceptance testing facility ready for operation by September 1963.

The total number of stands required is based on the twofold requirements of research and development testing, and production testing. One Delta 2 stand will be used on a continuing basis for system research and development throughout the production period. One position of the second Delta 2 stand will also be oriented toward research and development but will retain capability for system altitude simulation; the second position of the second Delta 2 stand, as well as both positions of the Delta 3 stand, will be devoted to production testing. The quantitative needs for production testing are based upon an average requirement of one position per week per engine; this schedule establishes the need for three test positions to minimize slack time.

	Fiscal year 1962	Fiscal year 1963
Cost estimate, Delta 2 stand:		
(a) Land acquisition		
(b) Site development and utility installations	$38,000	
(c) Facility construction and modifications	2,667,460	
Test stand modification	90,600	
Liquid hydrogen storage and transfer systems	1,282,000	
Liquid oxygen systems	7,000	
Gaseous hydrogen systems	259,500	
Altitude equipment support	608,360	
Off-stand propellant tankage	420,000	
(d) Equipment, instrumentation, and support systems	281,420	
High-frequency instrumentation and recording equipment	177,140	
Laboratory and shop equipment	104,280	
(e) Design and engineering services	183,120	
Subtotal, Delta 2 stand	3,170,000	
Cost estimate, Delta 3 stand:		
(a) Land acquisition		
(b) Site development and utility installations		
(c) Facility construction and modifications	924,000	$2,352,000
Structural and foundation work	168,000	84,000
Propellant storage and transfer system including hydrogen recovery system	168,000	756,000
New superstructure and tankage	588,000	1,260,000
Modifications to test facilities in the components test laboratory		252,000
(d) Equipment, instrumentation, and support systems	2,900,000	1,104,000
Electrodeplating and electrostatic metal-removal equipment		504,000
Liquid hydrogen flow-calibration equipment	200,000	
Environmental laboratory equipment		200,000
Development and production test equipment	2,700,000	
Instrumentation, controls, and cabling		400,000
(e) Design and engineering services	256,000	544,000
Subtotal, Delta 3 stand	4,080,000	4,000,000
Total estimated cost	7,250,000	4,000,000

Mr. THOMAS. You have another engineering design cost here. What is the total cost of $4 million? Is that the wrap-up cost?

Dr. SEAMANS. It is.

Mr. THOMAS. Insert 14–I 1 and 2.
(The pages referred to follow:)

FACILITIES FOR M–1 ENGINE PROGRAM, VARIOUS LOCATIONS

DESCRIPTION

The construction of four dual static test positions is required for the development of the 1-million-pound-thrust hydrogen-oxygen engine. This engine is designed to serve in the second stage of the NOVA vehicle. By using higher impulse propellants in the second stage, NOVA payloads will be increased significantly. It will thus be possible to transport a large vehicle capable of achieving a manned lunar landing and subsequent return without the need for a space refueling effort.

An engine contractor has not been selected for this program. This project writeup is, therefore, not based upon a specific location, but upon typical facilities presently available at engine contractor installations. After a contractor is selected and engineering studies completed, detailed requirements and cost estimates can more accurately be established.

Based upon an evaluation of existing facilities it is considered that the necessary test positions can be acquired through extensive modifications or additions to existing facilities. The work will generally include the removal of existing superstructures, making structural changes or additions, the fabrication and installation of flame deflectors, the installation of propellant runtanks with necessary piping and appurtenances, and the fabrication of a new steel superstructure for the erection of support run tanks and engine mounts. It is also proposed to equip one test position with an altitude simulation capability.

Other typical requirements may include the need to modify or construct component test cells, increased propellant storage and pressurization facilities, transfer lines, a gaseous hydrogen recovery system, and additional control cables for new instrumentation to be located within the control center.

JUSTIFICATION

Research and development funds will be obligated in the fiscal year 1962 to initiate work on the M–1 engine development program. Work will be started on individual engine components and on the complete engine system. The research and development funding in the fiscal year 1963 will reach a level of about $55 million. The development program will subsequently progress to a stage which will require testing of the full-scale engine. These engine tests will be experimental in nature and will consist of complete engine assembly runs to detect and eliminate design and fabrication malfunctions and deficiencies. The test stands and component test facilities must be funded during the fiscal year so that their design and construction may keep pace with the development program.

Four positions are considered necessary to meet the research, development, and production schedules. Detailed computations concerning the level of position requirements have been completed.

The total facility requirements for this program cannot be firmly established until a contractor is selected. Based upon average requirements, however, it is estimated that additional subsequent years' funding of approximately $2 million may be required.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$500,000
Site preparation	$200,000	
Utility connections	300,000	
C. Facility construction and modifications		8,060,000
Test stand modifications	$7,260,000	
Components test cell modifications	800,000	
D. Equipment, instrumentation, and support systems		5,600,000
Propellant storage and transfer systems	$2,800,000	
Gaseous hydrogen recovery system	1,200,000	
Instrumentation and controls	900,000	
Equipment	700,000	
E. Design and engineering services		1,840,000
Total estimated cost		16,000,000

RESEARCH AND DEVELOPMENT COSTS FOR M–1 ENGINE

Mr. THOMAS. Let us look at the M–1 engine program. This is the 1 million pound thrust. I ask how much research in the M–1 for 1962?

Dr. SEAMANS. $26 million in the supplemental.

Mr. THOMAS. How much for 1963, $55 million?

Dr. DRYDEN. That is for 1963; yes.

Mr. THOMAS. Is that the total wrap-up cost?

Mr. HOLMES. Not for development. It is approximately $130 million.

Mr. THOMAS. It will be $130 million?

Mr. HOLMES. $130 million R. & D., sir.

Mr. OSTERTAG. What is it for this year?

Dr. SEAMANS. $55 million for 1963. There is $26 million in the 1962 supplemental.

Mr. THOMAS. This started with a supplemental, $26 million. Now they have $55 million here.

Mr. OSTERTAG. $55 million over and above the 26?

Dr. DRYDEN. Another $50 million to go on top of that.

Mr. THOMAS. About $125 million, then.

Dr. DRYDEN. $130 million was the figure given earlier.

Mr. THOMAS. Who is the contractor?

Dr. DRYDEN. Aerojet.

Mr. THOMAS. This is the second stage of the NOVA?

Dr. DRYDEN. The engine for it; yes.

Mr. THOMAS. You state an engine contractor has not been selected, but I believe that has been changed since then?

Dr. DRYDEN. They were selected after this material was prepared.

MANNED SPACE FLIGHT CONTROL CENTERS

Mr. THOMAS. Insert 14–J1, 14–J2, 14–J5, and 14–J6 in the record.

(The pages referred to follow:)

MANNED SPACE FLIGHT CONTROL CENTERS, VARIOUS LOCATIONS

DESCRIPTION

The manned lunar landing program requires the following control centers:

Modifications to the MERCURY control center.—This work will include the addition of trajectory displays for flight control functions associated with the

mission objectives of the Gemini program. Gemini missions will include unmanned and manned orbital flights of the spacecraft and ultimately, accomplishment of a rendezvous between the Gemini spacecraft and an AGENA target vehicle. New and additional consoles for support of the flight control functions will be required to effect control of the AGENA target vehicle.

Revisions and extensions will be made to telemetry systems to permit real-time and near real-time monitoring of additional parameters from the complex spacecraft and the AGENA target vehicle. Improved data handling systems will be required for automatic data processing and for an increased rate of data handling. Revisions will be made to the communication center to permit communication capability with Gemini and possibly Apollo launch facilities and with the necessary guidance and control facilities. Additional building space will be added to house new equipment.

Apollo mission control center.—While neither the configuration or the location of this center have been established, it is estimated the center will require the following facilities:

(*a*) Computer complex: This facility will provide the center with a computational capability and computational rate which will be sufficient to handle the data processing necessary for real-time determination of vehicle position and velocity, for spacecraft systems checkout, mission analysis, and other associated computations throughout the flight phase of the mission. The computer complex will also be capable of computations required for simulation and training exercises.

(*b*) Communications switching and distribution facility: Switching, relay, and distribution panels will be required to control and direct the information flow associated with the center. The information flow includes voice communication capability to and from the spacecraft via relay through any of the remote stations; the transmission of guidance commands, event information and other data to the spacecraft; the reception of processed vehicle telemetry data from remote stations; the control and conduct of all ground support activities; and all tracking and tracking support data.

(*c*) Teletype facilities: This communication media will supplement and provide a backup for voice communications and telemetry links. Nonmission logistics support traffic will normally be handled via teletype.

(*d*) Spacecraft simulator facility: A facility is required to allow spacecraft and associated equipment to operate in conjunction with simulator equipment to provide astronaut and mission personnel training and procedural development.

(*e*) Mission operation facilities: Space is required for prelaunch, powered flight, space flight, and recovery monitoring. Included will be support areas equipped with appropriate data display areas, plot boards, status boards, consoles, communication systems, and associated control amplifier equipment.

(*f*) Audio, video, telemetry recording, and playback equipment: Magnetic tape recording devices and associated playback equipment will provide for post-mission analysis and during-mission analysis of communications, television, spacecraft systems and medical data which are not evaluated in real time or require extended evaluation periods; means will also be provided for the reevaluation of real-time data.

(*g*) Data selecting and processing equipment: This equipment will permit automatic computer programing, storage, and selecting. Computational capability will be provided for the processing and editing of data for determination of the data format and computer program selection to most efficiently utilize available information flow from remote stations linked to the spacecraft.

(*h*) Meteorological and space phenomenon forecasting facilities: The center will include the capability of monitoring data pertaining to the atmospheric density, worldwide weather complex, cosmic storms, radiofrequency propagation, meteorite storms, space radiation intensities, and other space phenomena which bear directly upon mission success.

(*i*) General facilities: Areas will be provided for building maintenance, storage, systems maintenance, engineering tests, viewing rooms, and engineering and administrative support.

Preliminary planning indicates the need for a two-story structure with a partial subfloor to provide approximately 50,000 to 70,000 square feet of floor space. Special requirements for this structure are high ceiling areas, false flooring areas with movable panels, and subflooring areas for cable routing.

APOLLO landing and recovery control centers.—The proposed configuration of these centers has not been fully developed. It is estimated that four of the centers will be required each to include a landing and recovery control area

equipped with appropriate control consoles and data displays for the presentation of navigation and guidance information derived from tracking, communication, and telemetry data. High frequency, ultrahigh frequency, single sideband, and land cable communications equipment will be provided at the centers, which will be compatible with voice and teletype communications at the Apollo mission control center, on board the spacecraft, and within the recovery forces. Telemetry, tracking, and data processing equipment will be required to facilitate ground controlled approach landings of the spacecraft. Facilities will be provided for building maintenance, electrical power generation (normal and emergency), and for engineering and administrative support. A one-story facility is planned for each center, to provide approximately 5,000 square feet of floor space.

Cost estimates

Modifications to the MERCURY control centers:		
A. Land acquisition		----------
B. Site development and utility installations: Site preparation		$5,000
C. Facility construction and modifications: Addition to present MERCURY control center (1,600 sq. ft. of area at $50 per square foot)		80,000
D. Equipment, instrumentation, and support systems		4,320,000
Consoles and associated equipment	$600,000	
Telemetry system	1,300,000	
Automatic data processing equipment	1,500,000	
Communication equipment addition	920,000	
E. Design and engineering services		595,000
Subtotal, MERCURY center		5,000,000
APOLLO mission control center:		
A. Land acquisition		----------
B. Site development and utility installation		----------
C. Facility construction and modifications		----------
D. Equipment, instrumentation, and support systems		----------
E. Design and engineering services		5,000,000
Subtotal, APOLLO center		5,000,000
APOLLO landing and recovery control centers:		
A. Land acquisition		----------
B. Site development and utility installations		310,000
Utilities: 4 sites at $20,000 per site	$80,000	
Roads and landing strips	230,000	
C. Facility construction and modifications		1,200,000
4 buildings; 5,000 sq. ft. per building (20,000 sq. ft. total at $50 per square foot)	$1,000,000	
Antenna mount construction	200,000	
D. Equipment, instrumentation, and support systems		6,330,000
Communication, tracking, and data processing equipment	$3,500,000	
Instrumentation	1,630,000	
Support systems	1,200,000	
E. Design and engineering services		160,000
Subtotal, APOLLO landing and recovery control centers		8,000,000
Total estimated cost		18,000,000

LOCATION OF FACILITIES

Mr. OSTERTAG. Is this the Cape Canaveral control center?

Mr. HOLMES. Location has not been specifically decided. We are looking seriously at Houston as a location.

Dr. DRYDEN. When you go to the moon it is not so important to be at Canaveral.

Mr. OSTERTAG. It states modification to the MERCURY control center.

Mr. HOLMES. That is one part of the project.

Mr. THOMAS. Four centers will be required for support of the APOLLO mission.

Dr. DRYDEN. Technically the $5 million should have been shown under "Atlantic Missile Range" and $13 million at various locations.

Mr. OSTERTAG. That is what confused me.

SPACE RADIATION EFFECTS LABORATORY

Mr. THOMAS. Let us look at the "Space radiation effects laboratory," K 1 and 2. Also insert 14–K 6 and 7.

(The pages referred to follow:)

SPACE RADIATION EFFECTS LABORATORY, VARIOUS LOCATIONS

DESCRIPTION

This project proposes construction of a space radiation effects laboratory capable of simulating the high-energy corpuscular radiation, both electrons and protons, encountered in trajectories or orbits of proposed space vehicles. Special significance is attached to the simulation of electrons and proton energy of the belts and the proton flux of the solar flare radiation. Two accelerators are included: one a linear electron accelerator; the other a frequency modulated cyclotron capable of accelerating heavier charged particles of which the proton is the most significant.

The linear electron accelerator will be a self-contained commercial unit rated at 2 to 10 Mev. The essential elements of the device are an L-band klystron (1,300 mc.) and an accelerator waveguide. The klystron will provide both the source of electrons and the source of radiofrequency power to drive the waveguide. By means of a novel mechanical arrangement, a single colinear vacuum system (10–8 mm Hg.) can be established from the hot-cathode electron source through the klystron and waveguide to the exit window. Beam power can be continuously variable, and the electron beam can be diffused to cover a target 10 by 4 inches at 2 feet from the exit window. Electron dose rates can be varied continuously from zero to 5×10^8 roentgens per minute. This unit has the further advantage that by replacing the exit window by either a heavy metal target or a beryllium target a source of X-rays or neutrons can be made available. X-ray doses are variable to a maximum of 5×10^6 roentgens per minute, and a total neutron production of 1×10^{11} neutrons per second can be obtained. Total power input to the device is estimated at 75 kva.

The heavy ion accelerator will be a frequency modulated cyclotron capable of accelerating pulses of protons to an energy of about 600 Mev. The beam intensities produced will be of the order of 1 microampere or $6 \times 10^{+12}$ particles per second. By changing the gas in the ion source from hydrogen to heavy hydrogen or helium, the accelerated ions can be changed from protons to deuterons or alpha particles with an energy approximately proportional to the increase in mass provided the radio frequency can be reduced sufficiently.

It is estimated that a cyclotron of this capacity will require a magnet consisting of 2,500 tons of iron and 150 tons of oil-cooled copper wire windings. The magnet will be energized by a 600-kilowatt motor generator set. Radiofrequency power of about 200 kilowatts and of variable frequency will also be required to energize the dees or accelerating electrodes. The maximum radius of the beam will be 89 inches. The facility will be approximately 35 feet in diameter and 22 feet high.

The cyclotron will differ from those widely used in basic physics research by having somewhat specialized beam ejection and control. It is desired that the beam be diffused in order to cover the larger targets than are envisaged, that is, material specimens and electronic circuitry. Targets as large as 1 square foot are being considered.

Both accelerators will require substantial shielding for the protection of operating personnel. The linear accelerator can be housed in a small room with concrete walls of the order of 3 feet thick. The frequency modulated cyclotron presents a more serious shielding problem. Heavy shielding blocks will be assembled about the cyclotron at ground level. These walls will be about 12 feet thick.

The building to house both accelerators and the control rooms will enclose approximately 11,000 square feet.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$500,000
Utilities	$420,000	
Grading and paving	80,000	
C. Facility construction and modifications		11,000,000
Cyclotron	$10,300,000	
Housing (11,000 square feet, at $22.70 per square foot)	250,000	
Auxiliaries and foundations	450,000	
D. Equipment, instrumentation, and support systems		820,000
Electron accelerator and associated equipment	$550,000	
Instrumentation	270,000	
E. Design and engineering services		62,000
Total estimated cost		12,382,000

NATURE OF TESTING FACILITY

Mr. THOMAS. What kind of design will this be for $11 million?

Mr. DIXON. This facility will be essentially an accelerator which is very similar to a cyclotron, a modified one, which will give us electrons and protons. These electrons and protons simulate the radiation effects from the sun which come into the radiation belt. What we plan to do is to simulate the conditions and test various materials for shielding and also various structural materials.

Mr. THOMAS. I asked why it is needed. You have many installations where these tests can be made. Why build a new one?

Mr. DIXON. We do not have a facility which simulates these radiation belts.

Mr. THOMAS. I know you do not, but can you not use some of those of atomic energy?

Mr. WYATT. The high-energy accelerators in use in universities result in a very, very tiny beam. In other words, they focus the beam down into just one particle after another.

The objective here is to expose a rather large surface representing a spacecraft surface so instead of having this very, very highly energized central beam you have a much larger working area than in the conventional accelerator.

NOVA STAGE MANUFACTURING FACILITIES

Mr. THOMAS. NOVA stage manufacturing facilities. Insert CF 14–L1, CF 14–L2, and CF 14–L4 in the record.

(The pages referred to follow:)

NOVA STAGE MANUFACTURING FACILITIES, VARIOUS LOCATIONS

DESCRIPTION

Initial funding is requested for the construction of highly unique plant facilities required for the major subassembly and for the final assembly of the NOVA vehicle. Present plans call for a production rate of eight vehicles per year and the size of the plant will be predicated on this production rate.

The F–1 engines, which make up the N–1 (first) stage of the NOVA vehicle will be developed, produced, and static tested at facilities available in California. The units will then be shipped to the gulf area for assembly into N–1 stages. The stages will be shipped by barge through existing waterways to the Mississippi test facility for static testing. Shipment will then be by water to Cape Canaveral for mating with upper stages. Launch will take place from the same location. The M–1 engine which makes up the NOVA vehicle second stage, will follow a similar process.

The plan dictates a gulf coast location for construction of the NOVA stages. However, the unique high bay facilities required for final assembly, as well as the large amount of space required for component assembly, require a thorough evaluation of existing plant facilities to minimize the need for new construction. This project has been included in the fiscal year 1963 budget because the probability that such facilities exist appears remote. The description of a typical plant facility that will be required follows:

(*a*) An area of approximately 173,000 square feet with a total height of 70 feet will be required. The area will be used for the assembly of major components such as the thrust frame assembly, propellant container bulkheads, and cylindrical skin sections. The power unit, composed of the thrust frame and engines, will also be asembled in this area. Provision will be made for three floating assembly platform stations which will carry the final assembly fixture.

(*b*) It will be necessary that the facility provide an area of approximately 180,000 square feet with a total height of 150 feet. This area will contain six bays which will be used to assemble the propellant container, and to hydrostatically test, clean, and paint it. These operations will take place in four bays equipped with heavy-duty concrete floors, a water storage and demineralization system, and equipment for cleaning and painting. The remaining two bays will be used for the final assembly and checkout of the complete platform which will be floated into position. All other fabrication and assembly operations for both the first and second stages will be performed in other conventional height facilities.

JUSTIFICATION

Studies and analyses conducted to date of the possible methods for assembling the N–I and N–II stages lead to the conclusion that the inordinately large size and weight of components make material handling the governing factor in the assembly process. In this instance, handling of each stage in a vertical position is considered to be the most practicable method. Thus, problems which might arise from temperature differentials, stress, sag, materials handling, and assembly, are minimized. The probability of obtaining a vehicle of high reliability is improved. However, verticle assembly also demands headrooms which are not normally available in manufacturing plants. As stated above, heights of 70 and 150 feet are required, and to date it has not been possible to locate facilities which approach the height, overall size, and location criteria.

The requested floor area is a function of component size, number of units to be fabricated, and the time required for assembly. Since the diameter of the stage will be 50 feet, the work stations have been planned as 100-foot modules; 50 feet for the unit, and 25 feet on all sides as a work area. The number of work stations has been determined through an analysis of the time to be spent in each functional area as well as the number of units to be fabricated.

The cost estimate shown below is based upon minimum requirements to initiate construction. An incremental amount is requested since total facility construction requirements cannot be ascertained until the site and a stage contractor are selected. The funding requested in this budget provides for the initiation of construction which will include site development, utilities installations, foundations, substructures, and superstructures for an N–I stage fabrica-

tion facility. The total area required for manufacture of both stages N–I and N–II was discussed earlier in this writeup. The cost estimate below, however, provides for only the minimum plant required for fabrication of the N–I stage. Additional requirements to complete the N–I facility and to permit construction of the N–II stage will be established at a later date.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$710,000
Site preparation	$100,000	
Utility installation and connections	140,000	
Paving	135,000	
Canal	335,000	
C. Facility construction and modifications		13,615,000
High bay area (150 feet high; 81,000 square feet at $90 per square foot)	$7,290,000	
Low bay area (70 feet high; 115,000 square feet at $55 per square foot)	6,325,000	
D. Equipment, instrumentation, and support systems		1,775,000
Total estimated cost		16,100,000

NOVA ASSEMBLY OPERATIONS

Mr. THOMAS. You have an area of approximately 173,000 square feet, total height of 70 feet to be required.

You state:

Initial funding is requested for the construction of highly unique plant facilities required for the major subassembly and for the final assembly of the NOVA vehicle. Present plans call for a production rate of eight vehicles per year and the size of the plant will be predicated on this production rate.

Then you state:

The stages will be shipped by barge through existing waterways.

Mr. HOLMES. Neither the first or second stage has been developed.

Mr. THOMAS. Where are you going to test them?

Mr. HOLMES. At the Mississippi test facility. This facility is to manufacture them, just as we are doing the ADVANCED SATURN. This will do the comparable job except for the NOVA.

Mr. OSTERTAG. Are you actually in the manufacturing business?

Dr. SEAMANS. We have the fabrication of the first stage of the SATURN.

Dr. DRYDEN. We are requiring industry to finally assemble these stages in the Government plant. This may be at Michoud.

Mr. OSTERTAG. This is an assembly operation?

Dr. DRYDEN. That is right. The pieces could be manufactured all over the country.

(Discussion held off the record.)

Mr. HOLMES. I gave a figure of one and a half billion dollars. I wish I had said two and a half billion dollars which may be a more accurate figure.

Dr. DRYDEN. Just say you don't know except that it will be a very large sum.

Mr. HOLMES. This is a big rocket.

WALLOPS STATION

Mr. THOMAS. Let us look at Wallops Island. Insert 15–A1 in the record.

(The page referred to follows:)

Wallops station—Summary of estimate for 1963

Advanced data acquisition system	$1,500,000
Modification and expansion of range control, safety, and support systems and equipment	2,000,000
Vehicle checkout facilities and equipment	800,000
Total	4,300,000

Mr. THOMAS. You have three items here. There is a modification of the range control.

Wallops is where you test the scientific instruments?

Dr. NEWELL. That is right.

Mr. THOMAS. You have a fine installation there, have you not?

Dr. NEWELL. That is right.

Mr. THOMAS. Is that causeway worth the money?

Dr. NEWELL. Yes.

Mr. THOMAS. How much time does it save you?

Mr. WYATT. At least three-quarters of an hour one way.

Dr. DRYDEN. Every employee who works on the island saves 80 minutes a day.

ADVANCED DATA ACQUISITION SYSTEM

Mr. THOMAS. Insert CF15–A3 and A5.

(The pages referred to follow:)

ADVANCED DATA ACQUISITION SYSTEM, WALLOPS STATION

DESCRIPTION

This project will extend and upgrade the existing telemetry data acquisition systems of the Wallops station by the addition of a high-gain, multiple-frequency, automatic tracking antenna, preamplifiers, receivers, and associated data-handling equipment. The improved facilities will adequately cover the necessary portions of the higher frequency regions being planned for usage, and will provide new telemetry receiving techniques and predetection recording. In addition, to the standard telemetry recording techniques, new digital methods will be utilized in recording and processing the data onto cards and magnetic tape that are compatible with existing digital computers and associated equipment.

JUSTIFICATION

The development of new telemetry equipment and techniques, operating over a broad frequency spectrum and at ever-increasing vehicle ranges, requires a high-gain, quick-change, multiple-frequency, automatic-tracking antenna system. Associated with this system are the necessary preamplifiers, receivers, and data-handling equipment. Advanced research projects particularly in the area of radio attenuation measurements will extensively utilize the new higher frequency telemetry equipment and techniques for data acquisition in order to penetrate the ionization sheath of reentry vehicles.

The procurement of pulse code modulation equipment is required to support future satellites, deep space probes, and early developmental flight tests of advanced space systems. The equipment is required to maintain a state-of-the-art telemetry data acquisition and handling capability and to meet the broad frequency spectrum and extended range requirement of advanced projects.

Cost estimates

A. Land acquisition		
B. Site development and utility installations		$100,000
Site preparation and pilings	$50,000	
Access roads	25,000	
Utility connections	25,000	
C. Facility construction and modifications		100,000
Antenna tower	$100,000	
D. Equipment, instrumentation, and support systems		1,285,000
High-gain antenna	$600,000	
Telemetry receiving and processing equipment	685,000	
E. Design and engineering services		15,000
Total estimated cost		1,500,000

Mr. THOMAS. What is the advanced data acquisition system?

Mr. BUCKLEY. We have kept the equipment pretty much to a minimum. The rockets are going farther out and farther up.

STATUS OF WALLOPS ISLAND FACILITY

Dr. DRYDEN. Do you know Wallops Island is as big as the original Canaveral area?

Mr. THOMAS. How large in Canaveral?

Mr. WYATT. Canaveral is 17,000 acres.

Mr. THOMAS. The island is not so big.

Dr. SEAMANS. Seven miles long.

Dr. DRYDEN. The ocean frontage is the same rather than the area.

Mr. THOMAS. When did you buy that property, 10 or 12 years ago?

Mr. ULMER. I believe it was 1946.

Mr. THOMAS. What did it cost you then? You bought it for about $100 an acre, did you not?

Mr. ULMER. Less than that.

Mr. BUCKLEY. We are using about half of the island now.

Mr. THOMAS. You have some land left?

Mr. BUCKLEY. Yes, sir.

Mr. THOMAS. What about the new test stands and everything else? Are those completed?

Mr. BUCKLEY. We have three major ones there. I am afraid you will see additional test stand requests, especially as rockets change.

Mr. WYATT. Incidentally, as a matter of interest to the committee, you will recall the very severe storm they had there this spring. It did a lot of damage at Wallops but the boys got on the job and we launched the SCOUT with a delay of about 2 days. They went right to work and got the facility back into operation.

It was standing in 2 feet of water. They got right back in and got off a successful SCOUT.

Dr. DRYDEN. The station manager, Kreiger, was on the ball. He contracted for the bulldozers to clean off the stand before the other people on the coast woke up to the fact they needed them.

Mr. OSTERTAG. What was on Wallops before you located there?

Dr. DRYDEN. A hunting lodge, a lighthouse, and a Coast Guard station.

Mr. OSTERTAG. There is nothing else there now?

Dr. DRYDEN. Our installation.

Mr. OSTERTAG. Just your installation?

Dr. DRYDEN. That is right.
Mr. THOMAS. Off the record.
(Discussion held off the record.)

VEHICLE CHECKOUT FACILITIES AND EQUIPMENT, WALLOPS STATION

Mr. THOMAS. Insert 15–C1, C3, and C4.
(The pages referred to follow:)

VEHICLE CHECKOUT FACILITIES AND EQUIPMENT, WALLOPS STATION

DESCRIPTION

This project will provide the facilities and equipment needed for testing and ready-servicing of advanced configurations of space vehicles and their associated components at Wallops Station prior to launching. The project will consist of—

(*a*) The construction of a ready service building with blast walls and protective partitions, which will permit the maintenance of assembled vehicle combinations in a standby status in close proximity to the launch areas.

(*b*) Modifications to existing facilities, including the launch service towers, to conform to new vehicle configurations; external power and control arms; terminal structures in the launch areas; and existing checkout facility structural modifications required for proper installation of new environmental and test equipment.

(*c*) Procurement of automatic and semiautomatic sequencers, special external power supplies, monitors, environmental test devices, and other equipment to meet the requirement for testing and checkout of vehicles and associated components for telemetry and payload performance tests, system guidance checks, and semiautomatic countdown and monitoring techniques.

JUSTIFICATION

The initiation of advanced space programs requires the Wallops station to have facilities available to assemble, test, maintain in ready state, and launch space vehicles of increased complexity over those currently utilized. For example, Algol clusters, and larger solid propellant vehicles with new and varied combinations of upper stages and configurations will be employed as booster systems for advanced experiments and programs. In many cases guidance components will be added to these vehicle combinations for the first time.

The significantly increased number of complex multistage vehicles, such as those to be used in the advanced Trailblazer program, requires that several completely ready vehicles be maintained in ready state to be launched on short notice in accordance with payload demands on meteorological conditions and range instrumentation availability. Vehicles of this nature cannot be maintained in proper state of checkout readiness in the rocket dead storage areas on the mainland station, since final assembly and checkout procedures would have to be repeated each time the total vehicle was so handled. A ready service facility with suitable environmental controlled chambers is required on the launch island proper to receive vehicles that have completed testing, checkout, and aerodynamic alinement and balance. It is necessary that the facility be located in close proximity to the launch areas to avoid excessive handling and transportation prior to actual erection on the appropriate launcher. At the present time, the vehicle assembly shops are utilized in this capacity, insofar as space is available; however, under existing conditions this necessitates the unsafe practice of performing assembly, mating, and checkout procedures on some vehicle combinations in the same chamber or bay in which others are maintained in ready state for short notice launch. In addition, the existing assembly and checkout facilities will be inadequate in capacity and in size to accommodate the larger number of vehicle configurations requiring ready state servicing in the fiscal year 1963.

The utilization of new and varied vehicle combinations with increased complexities in upper stage configurations planned for launch in the fiscal year 1963 requires that existing launch and checkout support facilities be modified to meet the newly generated requirements. The addition of new components, such as those associated with guidance packages, require service tower platform addi-

tions and changes, and major adjustments and modifications to control arms and launch control cabling to properly service and perform necessary checks in the launch area. Modifications to launch area terminal structures will also be needed to accommodate the new equipment included in this project. Additional modifications are required to enhance the safety of launch area operations.

It is essential that prelaunch checkout systems keep pace with vehicle and payload advances. Developments in high energy ignition squibs, soon to appear in standard Wallops station vehicles, plus the addition of guidance packages on the advanced Trailblazer and altitude control systems for the SCOUT vehicle are examples which dictate the need for new procedures and equipment beyond the capabilities of those existing. Telemetry systems in the higher frequency regions (S-band) planned for the fiscal year 1963 will require new monitoring and test equipment. The overall added complexity of new vehicle configurations will require automatic and semiautomatic sequencers to expedite countdown procedures, the existing manual procedures and equipment being inadequate to effect a suitable checkout and test of the numerous additional functions. Related preassembly checkout equipment is necessary to improve the reliability of both the booster and the payload systems.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$150,000
Site preparation and piling	$50,000	
Access roads and parking	15,000	
Utility connections	85,000	
C. Facility construction and modifications		195,000
Ready service building (approximately 6,400 square feet at $23 per square foot)	$145,000	
Modification of existing facilities	50,000	
D. Equipment, instrumentation, and support systems		425,000
Automatic and semiautomatic sequencers	$90,000	
External power supplies	60,000	
Monitoring, test, and checkout equipment	275,000	
E. Design and engineering services		30,000
Total estimated cost		800,000

NATURE AND OPERATION OF VEHICLE CHECKOUT FACILITIES

Mr. THOMAS. What is this checkout facility?

Mr. DIXON. We bring rockets here and assemble them and actually check them out to see if the guidance systems——

Mr. THOMAS. You have a half dozen of those buildings down there already.

Mr. DIXON. You see, we have these solid rockets and we need a place that is safe, also. When we check out one of these things it could go off. We need a facility where we can locate the equipment.

Mr. THOMAS. 640 square feet at $23 a square foot. That is the construction.

Mr. DIXON. Yes, sir.

Mr. THOMAS. The equipment is $425,000.

Design and engineering is $30,000. What is the nature of the building? It will be exactly like the other buildings you have.

Mr. DIXON. We have a heated bay inside. You can put one of these small missiles here, like the stage of a SCOUT or a smaller missile, and you can assemble it and check it out behind the bays.

Also, the instrumentation is checkout equipment such as vibrators, shake table, et cetera.

Mr. THOMAS. I thought you shipped them over land already assembled. If you go to assemble them now you have to build a tremendous workshop.

Mr. DIXON. We ship them one stage at a time. Then we have to assemble them together and be sure all the electrical equipment between the stages is connected so that you can fire one stage after another. Also we check out the guidance system.

We have to insert the igniters, and——

Mr. THOMAS. This was the old Space Agency where you did the first work?

Mr. DIXON. That is right.

Mr. THOMAS. Off the record.

(Discussion held off the record.)

RANGE CONTROL, SAFETY, AND SUPPORT SYSTEMS

Mr. THOMAS. Insert CF15–B1, –B5, and –B6.

(The pages referred to follow:)

MODIFICATION AND EXPANSION OF RANGE CONTROL, SAFETY, AND SUPPORT SYSTEMS AND EQUIPMENT, WALLOPS STATION

DESCRIPTION

The modernization and expansion of range control, safety, and support systems and equipment will be accomplished by the direct replacement of obsolete equipment, the extension of existing systems to serve new range facilities, the updating of present systems, and by the addition of new euqipment.

The operational range control systems to be improved and extended include the cable plant and duct bank; and television, meteorological, programing, timing, frequency shift, microwave, communications, data display, and distribution systems. It will also be necessary to update and extend the photographic and optical tracking sites. The range safety systems will be updated by modernization of the command-destruct transmitter and by the provision of additional range safety display equipment. Utility systems will be modernized and expanded by providing critical standby power, by supplementing the water system, and by improving the power regulation equipment.

JUSTIFICATION

The expansion of vehicle preparation and instrumentation facilities will impose additional requirements on the control systems associated with range operations. These additional requirements must be met by a concurrent expansion and modernization of the range control systems. The modernization and expansion of photographic and optical tracking sites is necessary for more accurate optical coverage of model flights for detailed study. The production of accurate optical data requires that the sites be in an optimum location with respect to firing azimuth, sunlight, and range user's requirements. This project will provide optimum location of easy access, standardized, optical sites. The meteorological autotheodolite system is required for the determination of near real-time launcher setting corrections to accommodate the wind profiles at Wallops Island prior to launch, and for postflight analysis. The weather radar will extend and improve the station's weather forecasting facilities. It is necessary to modernize and extend the range of the command-destruct transmitter to maintain range safety coverage at the ranges attained by vehicles with orbital capabilities. Readout and display devices for vehicle parameters such as velocity must be provided.

The utility systems of Wallops Island must be modernized to continue safe and efficient operation of the range. The island water supply is inadequate at the present time. New wells, piping, and a ground level reservoir are needed for fire protection, pad deluge systems, and cooling. Updating of the power regulation system is necessary because the present equipment is either obsolete or has marginal capability, and spare parts are increasingly more difficult to obtain. The increasing size, complexity, and cost of vehicles and experiments has made necessary a source of emergency power for equipment vital to maintenance of range safety and, to the successful completion of experiments in progress in the event of an untimely commercial power failure.

Cost estimate

A. Land acquisition		
B. Site development and utility installations		$185,000
Site preparation and piling	$109,500	
Access roads and parking	37,000	
Utility connections	38,500	
C. Facility construction and modifications		395,500
Cable plant and duct bank expansion	$185,000	
Erection of photographic and optical tracking site towers	30,000	
Telescope tower	50,000	
Water reservoir	50,000	
Pumping station (320 square feet at $25 per square foot)	8,000	
Pump and chlorination building (500 square feet at $25 per square foot)	12,500	
Critical standby power building (2,500 square feet at $25 per square foot)	60,000	
D. Equipment, instrumentation and support systems		1,339,500
Pumps, chlorinator, and piping	$89,500	
Closed-circuit TV system expansion equipment	90,000	
Meteorological autotheodolite system	88,000	
Weather radar	100,000	
Programing and timing expansion equipment	100,000	
Frequency shift equipment	95,000	
Microwave system additions	50,000	
Communication system additions	120,000	
Analog display and distribution system expansion	100,000	
Telescope astrodome	25,000	
Modernization of command-destruct system	95,000	
Range safety display equipment	45,000	
Critical standby power generating and regulation equipment	342,000	
E. Design and engineering services		80,000
Total estimated cost		2,000,000

OVERALL SCOPE OF SPACE PROGRAM

Mr. THOMAS. Are there any questions?

Mr. OSTERTAG. I have no particular questions except to say that, after reviewing this construction of facilities program, as one phase of your overall budget, it certainly is a staggering and ambitious program. It seems that it is quite a jump from a year or perhaps 2 years ago.

Dr. DRYDEN. It is related to the decision of the President. I agree with you that the job of putting men on the moon in 10 years is a tremendous job. It does involve very large sums, very large rockets, very big and costly equipment.

Mr. OSTERTAG. But this is not wholly related to the man to the moon. It is related to all your space effort.

Dr. DRYDEN. The great bulk of the money is connected with the lunar effort.

Mr. OSTERTAG. What bothers me is this. I am very much in accord with the program. I am very much a believer that this program and the space exploration is essential and we should have it. But it is difficult for me to envision how you can manage such a rapidly progressing program of research because it entails supervision, it entails putting all these programs together because they are so interrelated.

I am just wondering if you have not got more than you can handle reasonably intelligently.

Dr. DRYDEN. I do not think so. Of course, this depends on your standards as to the degree of supervision over contractors. I explained how we could never do this construction program without calling on a group like the Corps of Engineers. I am willing to admit that right off.

In a similar fashion, in the R. & D., if we had to do this in Government laboratories, it would be absolutely impossible. As I indicated, about 90 percent of this money is spent with contractors.

We have the problem of supervision, we are learning a lot of things about supervision. We have had contracts transferred to us from Defense, where we have thought the best thing to do was to leave the existing management arrangements. We have found to our disappointment and chagrin that we have had to make some changes in some of these arrangements to change the contracts from contractors with DOD to contracts with NASA so that we could exert the influence which we feel is necessary on the progress of the work.

In general, I think we have assigned the larger core of technical people to monitoring these R. & D. contracts than has always been customary in Defense, for example, because we do feel that if the Government is going to get its value for these things, we are the customer, we must introduce this technical supervision as well as just an auditor into the plant.

NASA REIMBURSEMENT TO DOD

Mr. OSTERTAG. This overall budget entails "Salaries and expenses" and "Research and development" and "Operations," in addition to this broad construction program, and certainly part of it entails contracts of many kinds, including your contracts and relationships with the military. How much of this budget would you say roughly is involved with reimbursing or compensating the military for missiles and facilities or anything else? Do you have any notion on that? I am talking of the many things you have to do with the military. We know that in many instances their missiles and their boosters are all part and parcel of your operation. They do not just turn them over to you, you pay for them. I cannot think of them, but there are a number of relationships. I am just wondering if you people have any bookkeeping that would show that.

Dr. SEAMANS. We can obtain the number. Less than 20 percent.

Mr. OSTERTAG. In terms of dollars?

Mr. SIEPERT. This figure will doubtless change particularly this construction program, which has so much of the money. My recollection is that the figure was 25 percent last year.

Dr. SEAMANS. None of the SATURN or NOVA development funds are in it.

Mr. HOLMES. Of the 2.6 billion for manned space flight, I do not believe it is anything like 20 percent.

Mr. OSTERTAG. I wanted to bring out that is part of the whole picture of your operations. In other words, many of these things are military in the first instance and yet you utilize them, as I understand it, and you compensate them.

Dr. DRYDEN. We buy ATLASES through the existing contract that the Air Force has with Convair. We buy THORS through the existing contract they have with Douglas.

Mr. OSTERTAG. In other words, in instances that you mentioned it is not a contract with the Air Force, for example, it is a contract with the producer, who gives you whatever price might be applicable insofar as the Air Force contract is concerned.

Dr. SEAMANS. In those two examples, the Air Force contracts with Douglas and with General Dynamics for the boosters. We reimburse them.

Dr. DRYDEN. It is not a new contract, however. It is the same contract.

Dr. SEAMANS. It is an amendment to their contract.

Dr. DRYDEN. It is the same price to the Air Force as it is to us.

Mr. OSTERTAG. As they develop, say, a missile such as the ATLAS, and the end cost of an ATLAS, the actual cost over the production line today is not what it was in the development stage. You do have a great deal of benefit from the developments that have taken place in the military.

Dr. DRYDEN. Absolutely. We do not reimburse them for any fraction of the development cost.

Mr. SIEPERT. In 1961, I have the figure here, but this was for a much smaller volume of business, $755 million was placed under contract in that period of time; $221 million went to Government agencies. That is all Government agencies, but about 90 percent of this is Department of Defense; 29 percent, that is, of the entire dollar volume of business.

Dr. SEAMANS. The percentage figure is reducing as our program expands and we get into newer boosters developed specifically for our space program.

REVISED BUDGET PRESENTATION

Mr. OSTERTAG. I notice in your summary of appropriations that in comparison with 1961 and fiscal year 1962, under 1963 you omit the items or the total amount that would come under "Salaries and expenses" and then "Research and development," and you package it as $2,968 million under "Research, development, and operation."

Dr. DRYDEN. This was a Bureau of the Budget decision as to the format of the budget. I think probably in the hearing you gave the amount that represents the equivalent of salaries and expenses.

Dr. SEAMANS. That is right. The salaries and expenses account included personnel services that are now broken out as part of research and development operations and part of the institutional support.

The other part of the institutional support was contained formerly as support of plant under "Research and development."

Dr. DRYDEN. This change was originated by the Bureau of the Budget.

Mr. OSTERTAG. If this budget is approved as presented, and you tie your supplemental request of $156 million to your $3,787 million, you will have available funds over $4 billion for this next year. That is a job to spend that money. It is a challenge.

Dr. SEAMANS. We recognize that, and we are requesting additional personnel. We are also carrying out inhouse training of our key personnel so that they can better manage these large projects.

Mr. OSTERTAG. If we do not get frustrated in this picture and really go in all directions without regard to our ability to deal with them intelligently and wisely. I sometimes feel that we defeat ourselves, and while you do not call it a crash program, with this amount of spending, it comes very close to it.

Dr. DRYDEN. It is a fast program.

COST OF ACCELERATING LUNAR LANDING PROGRAM

Mr. RHODES. Dr. Dryden, as I understood your statement about getting to the moon, you said there was a new decision made to get there in 10 years. Actually, was not the decision to get there before 1970?

Dr. DRYDEN. Yes, by the end of the decade.

Mr. RHODES. What was the old timetable?

Dr. DRYDEN. The old timetable simply put it somewhere beyond 1970. We thought we would reach the stage of circumnavigation of the moon by 1970.

Mr. RHODES. How much money would you say is in this budget which would not be there if it had not been for the decision to accelerate the moon program?

Dr. DRYDEN. I have forgotten the figure.

Mr. WYATT. This budget probably has two and a fraction billion dollars directly chargeable to the acceleration of the lunar program.

Dr. SEAMANS. Some would have been there anyway. Of the total, $2.6 billion is for manned space flight, but some of it would have been there if we had not made the decision.

Dr. DRYDEN. This is difficult to say because you may recall that in Mr. Eisenhower's budget message he said he wanted to study further whether we should go beyond Project MERCURY. If you interpret that literally, the great majority of this $2 billion comes from the decision to go to the moon.

Mr. OSTERTAG. $2 billion?

Dr. DRYDEN. $2.6 billion for manned space flight. MERCURY has a very small amount in here.

Dr. SEAMANS. Some of it was for SATURN and was already included.

Mr. OSTERTAG. The $2.6 billion you speak of is not entirely in this bill?

Dr. DRYDEN. Yes, it is. Of the $4 billion, about half is associated with the decision to push forward with large boosters, manned space flight beyond Project MERCURY. This is accurate.

Mr. OSTERTAG. You are fully funding for that?

Dr. DRYDEN. No.

Mr. OSTERTAG. How can it all be there, then?

Dr. SEAMANS. This is for 1963.

Dr. DRYDEN. If the decision had stuck, we would stop manned space flight having put Glenn around once, you would not have this $2 billion here.

Mr. RHODES. As I understood, the full cost is about $7 billion.

Mr. WYATT. That was $7 billion over what we had projected we would spend in getting there more slowly.

Dr. DRYDEN. On the assumption that this decision would have been changed so we would proceed at a somewhat slower rate toward the lunar landing.

Mr. RHODES. I want to echo what some of the other members have said about the magnitude of the program. I feel very much in the position of one who has taken an awful lot on faith, and I think we have to. But it is my hope and belief that the people in this room will make sure that the American taxpayer gets the best possible program for the dollar which we spend because you people are in the best position to know about it. I think it is obvious to anybody who knows anything about the program that we could not hope to sit here in these few days and do a completely intelligent job of appropriating the funds. We will do the best we can. But in the final analysis, your efforts will be more decisive than ours in assuring the taxpayer of receiving his money's worth.

Dr. DRYDEN. I would like to say, Mr. Rhodes, we have attempted to be fully honest and open about the implications of the costs of this program.

Mr. THOMAS. You have not withheld anything.

Dr. DRYDEN. We see no benefit in trying to get a foothold in by beginning appropriations. We will do our best to see that we get our money's worth.

Mr. RHODES. It gives me a great feeling of confidence to sit here and hear you day after day do what you just said, which is to be absolutely open and aboveboard about everything and take us, I think, completely into your confidence as far as your plans are concerned.

Mr. THOMAS. While you are bragging on these gentlemen, caution them not to come up here with this performance budget next year, particularly for "Research and development" and "Salaries."

Dr. DRYDEN. It is not within our control, Mr. Thomas.

Mr. THOMAS. Our distinguished friend has had another honor bestowed upon him, Dr. Dryden. Mr. Boland and Mr. Ostertag and Mr. Rhodes called this to our attention the other day. It was in the paper. The Smithsonian passed out this honor. We congratulate you.

Dr. DRYDEN. Thank you. I got a nice letter from you. I failed to thank you for it.

Mr. THOMAS. We think this Smithsonian showed mighty good judgment. We are sort of proud of this staff here. In Mr. Webb we have a sensible businessman, a hard worker, an old hand at government, and being an old hand at government is worth a great deal to everybody.

Mr. BOLAND. Articulate, too.

Mr. THOMAS. Dr. Dryden is tops in anybody's book. Dr. Seamans has enough sense for 10 heads, practical business experience, a great scientist. The same goes for Mr. Dixon. One of our favorites is Mr. Holmes. People like these coming here from industry take a tremendous loss in salary.

You take a man like Dr. Newell, he is just like all the rest of us, money does not mean anything to him. If it did, he would be out in private industry where he could make fifty or seventy-five thousand a year. He could do that standing on one foot.

Dr. DRYDEN. Please do not tell him that.

Mr. THOMAS. We have Mr. Stoller, Mr. Buckley, Mr. Wyatt, all the rest of these distinguished gentlemen. Here is Mr. Dembling, Mr. Siepert, Mr. Cortright, Mr. Diaz, Mr. Finger, Dr. Kelley, and last on the list but certainly not least is Dr. Kurzweg. Tell us something about your background, Doctor. We like you.

Dr. KURZWEG. I was born in Germany.

Mr. THOMAS. How long have you been in this country?

Dr. KURZWEG. Sixteen years, a little more.

Mr. OSTERTAG. Were you with Von Braun?

Dr. KURZWEG. I was.

Mr. OSTERTAG. In what part of the country were you born?

Dr. KURZWEG. I was born in Dresden, in middle Germany. I went to school in Leipzig.

Mr. THOMAS. The university?

Dr. KURZWEG. Yes, the University of Leipzig. I was a pupil of Heisenberg and Debye and Schiller.

Mr. THOMAS. We are delighted and honored to have you.

Dr. DRYDEN. Dr. Kurzweg ran these very high speed wind tunnels that did the aerodynamic work on the V–2.

Mr. THOMAS. We are delighted and honored to have had you, gentlemen. Thank you for being so helpful.

THURSDAY, APRIL 19, 1962.

NATIONAL AERONAUTICS AND SPACE COUNCIL

WITNESSES

EDWARD C. WELSH, EXECUTIVE SECRETARY
RUSSELL W. HALE, ASSISTANT TO THE EXECUTIVE SECRETARY

SALARIES AND EXPENSES

Object classification

[In thousands of dollars]

		1961 actual	1962 estimate	1963 estimate
11	Personnel compensation:			
	Permanent positions		295	360
	Positions other than permanent		35	15
	Other personnel compensation		10	10
	Total personnel compensation		340	385
12	Personnel benefits		25	28
21	Travel and transportation of persons		45	40
22	Transportation of things		13	5
23	Rent, communications, and utilities		12	8
24	Printing and reproduction		12	5
25	Other services		24	10
	Services of other agencies		32	32
26	Supplies and materials		12	5
31	Equipment		30	12
	Total obligations		545	530

Personnel summary

	1961 actual	1962 estimate	1963 estimate
Total number of permanent positions		32	32
Full-time equivalent of other positions		3	1
Average number of all employees		27	30
Number of employees at end of year		35	33
Average GS grade		10.9	10.9
Average GS salary		$9,797	$9,913

NOTE.—Obligations incurred under allocations from other accounts are included in the schedule of the parent appropriation, "Emergency fund of the President, national defense."

Program and financing

	1961 actual	1962 estimate	1963 estimate
Program by activities:			
Policy coordination (total program costs) [1]		$520	$535
Change in selected resources [2]		25	−5
Total obligations		545	(3)
Financing: New obligational authority (appropriation)		545	(3)

[1] Includes capital outlay as follows: 1962, $10,000; 1963, $12,000.
[2] Selected resources as of June 30 are as follows: Unpaid undelivered orders, 1961, $0; 1962, $25,000; 1963, $20,000.

Mr. THOMAS. Will the committee please come to order.

We have with us Dr. Welsh, the Executive Secretary of the National Aeronautics and Space Council and his assistant, Mr. Hale.

It is a privilege and a pleasure to see you.

GENERAL STATEMENT

Mr. Reporter, include the statement and the justification in the record.

(The material referred to follows:)

JUSTIFICATION OF ESTIMATES FOR FISCAL YEAR 1963

The National Aeronautics and Space Council requests an appropriation for fiscal year 1963 of $530,000, to meet salaries and other expenses of the Council staff.

The Council staff was activated in March 1961, when the President appointed with the advice and consent of the Senate an Executive Secretary. In April 1961, by amendment to the National Aeronautics and Space Act of 1958, the Council was located in the Executive Office of the President. Until August 17, 1961, the staff was funded, in a limited fashion, first from the President's emergency fund until July 1, and then from advances against its fiscal year 1962 appropriation request. On August 17, an appropriation of $320,000 for the Council staff became law. Then, on September 30, 1961, a supplemental appropriation was received in the amount of $225,000.

The supplemental of $225,000 was justified on the fact that the original submission had been made prior to the President's decision to accelerate substantially the space program in all of its aspects. Such expanded and accelerated program projected a significant increase in workload upon the Space Council and its staff.

While the Space Council and its staff have been very active during the approximate 9 months of operation, there has still not been sufficient experience to establish a clear pattern for manpower and other requirements. However, such experience as has been obtained gives indication that the fiscal year 1962 appropriation of $545,000 approximates the amount needed for salaries and other expenses, in light of the currently projected space program. In fact, as a result of estimates of nonrecurring costs for certain equipment, etc., and through the use of consultants for peakload projects, the appropriation required for fiscal year 1963 is reduced by $15,000 as compared with this fiscal year.

A total staff of about 32 is planned, including the Executive Secretary, aerospace assistants, other professional staff, and clerical. The staff is under the supervision of the Executive Secretary, has the responsibility for preparing recommendations and taking other actions, through the Council, to advise and assist the President throughout the broad spectrum identified as "aeronautic and space activities." In reference to the activities concerning which the Council is to advise and assist the President, the law specifies no limit to such activities, but does state that they will include the following:

"1. Survey all significant aeronautical and space activities including the policies, plans, programs, and accomplishments of all departments and agencies of the United States engaged in such activities;

"2. develop a comprehensive program of aeronautical and space activities to be conducted by departments and agencies of the United States;

"3. designate and fix responsibility for the direction of major aeronautical and space activities;

"4. provide for effective cooperation among all departments and agencies of the United States engaged in aeronautical and space activities, and specify, in any case in which primary responsibility for any category of aeronautical and space activities has been assigned to any department or agency, which of those activities may be carried on concurrently by other departments or agencies; and

"5. resolve differences arising among departments and agencies of the United States with respect to aeronautical and space activities under this act, including differences as to whether a particular project is an aeronautical and space activity."

In brief, the Council's functions include surveying policies, developing programs, designating responsibilities, providing cooperation, and resolving differences. Performance of these functions applies to all aeronautic and space activities and to all departments and agencies of the Government engaged in such activities.

Some of the space areas in which staff members have responsibilities are communications, navigation, meteorology, manned military projects, manned nonmilitary projects, unmanned scientific explorations, booster and propulsion developments, employment of atomic energy, international relationships, legislative and budgetary changes, and Executive order preparation and modification.

To supplement the full-time work of the staff, funds are included to provide consultant services which will be required from time to time on specific projects. Provision is made in the estimates for necessary travel and for rental of motor vehicles on an as-needed basis. Provision is also made for transportation of things; rent, communication, and utilities; printing and reproduction; supplies and materials; equipment; personnel benefits; and other services.

Salaries and Expenses

Personnel compensation and staffing.—$385,000 for 32 permanent positions distributed as follows:

	1962	1963
Permanent positions	32	32
Average employment	27	30

Summary statement on "Other objects".—For 1963, $145,000:

12 Personnel benefits, $27,600: Includes contributions to retirement fund, $24,100; health benefits, $1,800; group insurance, $1,200; and FICA, $500.

21 Travel and transportation of persons, $40,000: Includes funds for travel to space research and development sites for first-hand study by Council staff. Also includes funds for payment to GSA motor pool for hire of automobiles when needed for transportation of officials and staff of the Council on official business in the Washington area.

22 Transportation of things, $5,000: Provides costs for shipment of supplies and materials and costs of moving household goods as provided by law.

23 Rent, communications, and utilities, $8,000: For telephone services and equipment usage and other utilities as required. Also included are telegraph and penalty mail.

24 Printing and reproduction, $5,000: Provides for printing and binding of reports, studies, and other publications as needed, and normal duplicating done on a commercial or reimbursable basis.

25 Other services, $42,400: Provides $25,000 reimbursement to GSA for administrative services, and $17,400 for health room services, office machine repair, furniture repair, personnel security checks, commercial contracts, etc.

26 Supplies and materials, $5,000: For office supplies and other work materials such as legislative bills, reports, enacted legislation, and periodicals.
31 Equipment, $12,000: For office furniture and equipment, including such items as typewriters and calculators.

Mr. THOMAS. Last year you had a regular appropriation bill and a supplemental. The supplemental was in the amount of $225,000. The appropriation was $320,000 which makes a total of $545,000.

This year I notice you are showing a reduction of about $15,000 from 1962 and the staff is practically the same with about an average of 30 positions.

Dr. WELSH. If I may interrupt there, it is an unusual situation to come in and ask for a reduction in the budget.

Mr. THOMAS. We agree with that. We see a good many budgets, but we don't see very many seeking a reduction.

This fund is for the President and the Vice President and we are inclined to go along with it.

Are you folks pretty busy?

Mr. WELSH. We are very busy, Mr. Chairman. I think we have made some accomplishments. The report the President made to the Congress this year on Space Council activity and other activity cites some of the things we have been doing and I think in brief summary indicates we have been pretty busy.

Mr. THOMAS. Thank you very much. It is nice to see you both. Come back and see us.

THURSDAY, APRIL 19, 1962.

DALLAS FEDERAL OFFICE BUILDING

WITNESS

HON. BRUCE ALGER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. THOMAS. Gentlemen, let the committee come to order.

We have the pleasure of having with us this morning our distinguished colleague, Mr. Bruce Alger, of Texas.

Congressman, we are delighted and honored to have you with us this morning. We welcome your advice and suggestions and your help on any matter in which you are interested.

If you have a statement you want to give us, fine. If you want to talk, that will be fine. We are at your service.

Mr. ALGER. Mr. Chairman, it is my pleasure to be here and I appreciate your courtesy in notifying me and giving me this opportunity to appear. I will make a brief statement if I may. I have no prepared or formal statement as such because I am well aware this committee knows considerably more about the appropriations and knows more about this particular appropriation than I do, although I have a complete file here which is about one-tenth of what is in my office on the subject.

Mr. THOMAS. You take your time and say what you desire.

Mr. ALGER. Without going too far into the history I will simply say the subject in which I am particularly interested at the moment is the Dallas Federal Building. Historically I want to make it plain it is not my project, as much as I would like to take credit for it. If

any credit were due it would go to my predecessor from whom I inherited the project together with the Federal Government representatives, and it has been considered by several Congresses and approved by both bodies of Congress on various occasions. I have statements from Vice President Lyndon Johnson and others approving the building.

I have also some material which I might leave for the record if the chairman feels it appropriate.

Mr. THOMAS. We will be delighted to have it.

Mr. ALGER. Earlier I had asked Mr. Floete some basic questions on the building. Let me say relative to the Dallas Federal Building I come here not to ask support for the building, oddly enough, but simply to ask the Members of Congress in their wisdom and this committee to either accept or reject the facts which Government, not I, have put on the record as to the merit of the project. If I speak for the bill at all I want it clearly understood it is only on merit. That is in three ways:

1. Will the building provide better service to the taxpayers?
2. Will it permit Government workers to work with greater efficiency and greater comfort?
3. Possibly most important: Will it be economically a sound project?

If the building fails on any or all of these counts I here and now say for the record I will not be in support of the building.

The only information I have which would lead me to say this building is necessary is information given me by the Government. I come here not pleading for a community's findings or for businessmen who obviously have a financial interest, since a building of this kind in downtown Dallas will enhance other property. I come here solely to ask this Congress in its wisdom and by its own findings to tell us, the people of Dallas, whether the building is justified or not. And the figures that I have here say it is but I cannot prove their accuracy. They were given me by Government.

I want to cover some of these figures and I will be brief.

Mr. THOMAS. Take your time.

Mr. ALGER. The prospectus for proposed construction under the Public Buildings Act of 1959 dated September 11, 1959, shows under "Justification" this statement:

> The resultant savings in rentals will be approximately $990,000 per annum.

Now, gentlemen, I have the figures here substantiating that but I cannot in good conscience tell you it will save $990,000 a year. I didn't make this survey. I don't know the accuracy of it and I am relying on that accuracy in pleading the case for the building. If it turns out that this will not economize then again as I said earlier I don't know that I would be for the building and you can very easily therefore tell me the building is not warranted and I would agree with you.

I don't want to go too far in telling this committee what these figures are. I will leave them with you but I am saying to the committee once again I am going to rely on your judgment, so I am putting you on your honor even as I must be on mine in testifying before you. I am not here as Members have been charged at other times, of asking for something that because we are paying big taxes we want our share back, or for political reasons or anything else.

I do have several questions I would direct to you which I think we have to answer frankly before you can justify this building, any more than I can, in good conscience—again I may be talking against the project. I will leave these questions. There are eight questions I asked of Mr. Floete. I will leave those questions and answers with you. I will leave the information here—and when I say "leave information" I know you have more than I have but then you will know to what I am directing my attention and therefore, critically, you can approve or disapprove my views based on other information you have as you look at my statement.

I have the net assignable space of the building.

I have the list of agencies or departments.

I have here a certificate for each of the departments as to determination of need, and the certification of need.

There are 17 Government agencies including the Tax Court and the district courts involved. I have a breakdown on the square footage. I have the cost per square foot, the managerial, the custodial cost, the amortization schedule, and additional information of a financial nature from Mr. Floete which as I have said may or may not be accurate in the view of the committee.

Now, with that presentation, gentlemen, I would like to leave then as exhibits the questions and answers I have directed to Mr. Floete. The prospectus of the building of 1959. Then going back even earlier for whatever worth it may be to the committee, the formal——

Mr. THOMAS. Do you have copies of your file here or do you want this preserved?

Mr. ALGER. I have copies.

Then I have the formal prospectus for the proposed building under title I, Public Law 519, 83d Congress, 2d session.

This goes back to July 3, 1956. That prospectus and the certificates of need of the various departments will be in this building.

If I may I will conclude by saying regardless of the charges and countercharges, that there is something I wished had never happened; namely, that this building was defeated by a straight party line vote in the Public Works Committee, the only time I think in the history of the committee this has ever occurred.

I regret that because I think it got a number of members off course. The reasons involved I do not think are important.

I say now as I said earlier when I was a member of the Public Works Committee when this building was considered, after I inherited it from my predecessor, that the people of Dallas have a pride in making sure of the merits of any project. Even as they have been behind me when I voted against projects in other districts when I have undoubtedly opposed every Member of Congress on some project or other, near and dear to that Congressman, now we say the same hard yardstick must apply to Dallas that we want to apply to the rest of the country, and that is, that the project be merited by the facts, by the economy, by the service rendered, and by the greater efficiency that will result and greater comfort to our taxpayer in getting the service from Uncle Sam.

It is true in Dallas, you would have to cover quite an area of the city if you made a mistake going to one agency and were sent to another. This would put all the agencies in one building, thereby providing greater service to the taxpayer.

Mr. THOMAS. A very, very fine statement and we will go into it and give it the best we have.

Mr. ALGER. There are two other items I wanted to mention.

Mr. THOMAS. Do you have a copy of this file too?

Mr. ALGER. As a matter of fact I might make copies of both of these before I give them up forever, if that is all right.

Mr. RHODES. How do the people of Dallas feel about this building?

Mr. ALGER. I would say it is a division and it is also partly a lack of understanding. Some are not sure. They are not sure, I feel many of them, about the economies. And I have to throw this back to you. I am not pleading for a building. I am pleading for a study by this committee to either accept or reject the studies the Government has already made—in both administrations, now—saying it is warranted.

Mr. THOMAS. Give us the entire file and we will return it to you. Do you know whether you have duplicates of both? We will take care of all of it and try to return it to you.

Mr. ALGER. When you talk about putting a building in any downtown city, under this direct appropriation bill we know that the cities lose taxes for that building, that property. But I would turn right around and remind my city friends who might worry about that feature that unquestionably any new building of this nature certainly enhances the value of other properties surrounding it and therefore the tax take should pretty well balance out.

As to the financial interests in the background I think this program was delayed for some time by a legitimate concern by the gentleman from Texas, Mr. Brooks, and his subcommittee who had reason to believe there might be questionable conduct on the part of 14 businessmen in downtown Dallas who sought to indemnify the Government—and have by the way, by several hundred thousand dollars—in site acquisition. It looked on the surface as though some people might reap an unconscionable gain. Because of that the Congress has had the GAO make a thorough investigation and that investigation is available to you by the way, in which they investigated this site acquisition and gave these men an unqualified clean bill of health and said that any further discussion of this nature properly would have to be before a court.

Mr. THOMAS. If you build a building in anybody's town it is going to help the surrounding property. There is nothing improper about that.

We thank you very much. Leave your file here and we will go into it very carefully. You were nice to come over and you have made a very fine statement.

THURSDAY, APRIL 19, 1962.

GAINESVILLE, FLA., VETERANS HOSPITAL; LAKE CITY, FLA., VETERANS HOSPITAL; GAINESVILLE, FLA., POST OFFICE AND COURTHOUSE

STATEMENT OF REPRESENTATIVE D. R. MATTHEWS, OF FLORIDA

Mr. THOMAS. Our distinguished colleague, the Honorable Billy Matthews from Florida has sent to the committee a very fine statement and we will insert it in the record at this time.

Mr. Matthews intended to appear in person before the committee but he had to go back to Florida as he had some urgent business to attend to for his constituents. He is there attending to his business in person, and also attending to his business here by a formal statement. We are always delighted to have the advice and help of Mr. Matthews. He is one of our very fine Members.

Insert the statement in the record.

(The statement follows:)

VETERANS' ADMINISTRATION HOSPITAL, GAINESVILLE, FLA.

Mr. Chairman, last October, after more than a decade of effort, the Veterans' Administration announced approval of a veterans hospital to be located at Gainesville, Fla. The site chosen for this new hospital is in close proximity to and will have a cooperative and friendly relationship with the $20 million J. Hillis Miller Health Center of the University of Florida, which embraces colleges, schools, and departments in all branches of the healing sciences.

Florida's population growth through the past two decades, which has been unparalleled in the Nation, and the proportionately large increase in our veteran population were important factors in the decision to go ahead as quickly as possible with this new VA facility, the need for which has been felt for many years, and which has become ever more pressing with each passing year.

It is my understanding that the sum of $722,000 has been recommended for design and planning of this veterans hospital. I am here to plead that this sum be authorized in order that the necessary planning work may go forward without delay. The early realization of this project will be of incalculable benefit to the ever-increasing veteran population of the State of Florida.

I appreciate your consideration in allowing me this opportunity to speak in support of this appropriation. It is one of the most meaningful projects so far as my district is concerned, that has challenged my interest during the time I have been in Congress.

VETERANS HOSPITAL, LAKE CITY, FLA.

For the past several years a program of expansion, renovation, and modernization has been going on at the veterans hospital in Lake City, Fla. Much of the planned program of modernization has been accomplished. Next month it is anticipated that there will be 466 beds in operation. In order to bring this modernization program into complete fruition, two additional buildings at the facility; namely, buildings 62 and 64, need to be modified, renovated, and air-conditioned. Condemned buildings will have to be removed, the fire alarm system must be perfected, parking facilities must be provided, and finally the grounds must be landscaped. For this work, the sum of $1,231,000 has been recommended for the next fiscal budget year.

For the past several years the list of veterans applying for admission to the VA hospital at Lake City and on the waiting list each month has almost equalled the list of those who were actually hospitalized. This ratio, in effect, is true in regard to the entire State of Florida. The renovations at the facility in Lake City should overcome to some extent this waiting list gap. I hope and pray, therefore, that the entire amount of $1,231,000 recommended in the budget may be allocated for the completion of the work at the Lake City VA facility. When completed this facility will add much to the medical care, treatment, and comfort of many more veterans who need and deserve proper hospitalization.

I most sincerely appreciate, Mr. Chairman, this opportunity to speak in support of the VA hospital appropriation for the Lake City facility, and sincerely trust that it will be authorized as recommended in the budget.

NEW POST OFFICE AND FEDERAL BUILDING AT GAINESVILLE, FLA., APRIL 19, 1962

I appreciate the privilege of making a brief statement in support of an appropriation for a new post office and Federal building at Gainesville, Fla., for which I am advised the sum of $2,376,000 is needed and has been recommended in the 1963 fiscal budget.

The present post office and Federal building, built more than a half century ago to serve a population of 8,000, has been trying to serve about 50,000 over the past several years. The work of our post office and also of our Federal court has been hampered because of the inadequacy of space, modern facilities, and equipment.

A site selection has been made and architect's design approved. With the authorization of the recommended appropriation of $2,376,000, this greatly needed project can be brought to a successful completion. I most respectfully request, Mr. Chairman, that the amount needed for construction of the new post office and Federal building at my hometown of Gainesville, Fla., be approved by this honorable committee. I thank you.

Federal Office Building, Bakersfield, Calif.

WITNESS

HON. HARLAN HAGEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. Thomas. We have with us this morning our very able and distinguished colleague, Mr. Hagen of California. The committee will be delighted and honored to receive your good advice and help and assistance on anything you want to talk to us about.

Mr. Hagen. Mr. Chairman and committee members, I am grateful for the opportunity to appear in support of funds for the construction of a new Federal building in Bakersfield, in my congressional district in California.

The necessity for this structure is well established. Your distinguished subcommittee recognized this need last year when the Bakersfield project was included among a number of proposed Federal buildings which your report stated the committee would expect to have included in the 1963 fiscal year budget program.

The administration has seen fit to include the sum of $1,444,000 in the budget of the General Services Administration for this building. It should be noted in this connection that $114,000 were appropriated in the fiscal year 1961 budget for development of site and architectural plans. The design work is now underway and is expected to be completed toward the latter part of the current calendar year.

I would also call the attention of the subcommittee to the fact that the city of Bakersfield acquired property within the site of the Bakersfield Civic Center in order to enter into an exchange with the Federal Government to permit the Federal building to be located in the civic center complex. This transaction has been approved by the General Services Administration and is in the final phase. I mention this fact to emphasize the interest and cooperative attitude of the city of Bakersfield.

I would respectfully urge that the committee act favorably on the recommendation by the executive department and that the $1,444,000 be appropriated for this project.

Mr. Thomas. That is a fine, concise statement. Thank you for taking time to come to see us.

PATERSON, N.J. HELICOPTER SERVICE AND FEDERAL SUBSIDY

WITNESS

HON. CHARLES S. JOELSON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. THOMAS. Our next colleague is the able and distinguished Congressman from New Jersey, Mr. Charles S. Joelson. We will be delighted to receive your judgment and advice on anything in which you are interested.

Mr. JOELSON. Thank you, Mr. Chairman. I am grateful for the opportunity to speak in behalf of the Civil Aeronautics Board budget recommendations for the helicopter services for fiscal year 1963 and the interest of the Paterson area in scheduled helicopter service, to connect it directly with Manhattan and the air terminals of New York City.

Paterson has proven to be about 2 years ahead of the factory production and Federal Aviation Agency approval of the twin-turbine helicopter designed to use the heliport the city built. Paterson invested taxpayers' money in the belief that the Federal Government would carry to conclusive test the helicopter experiment, especially since the new machines with their greater economic promise are close to scheduled use.

Paterson is the economic center of northern New Jersey, an area of specialized industry and commerce, and its people have wide national and international interests generating an unusual amount of air travel. Paterson products also move to all parts of this country and the free world.

Paterson first asked for helicopter service in 1949, and the Civil Aeronautics Board in 1952 recognized their need of short haul air transportation by designating Paterson as a point needing air service in the certificate granted New York Airways.

Because of the lack of a suitable landing area, service was not initiated at Paterson when mail service was started in 1953 to some other New Jersey points.

In 1958 city officials, backed by civic groups, acquired Monument Hill in the center of the city. This hill was then zoned and planned as a heliport.

The Paterson Heliport was built with the Federal Aviation Agency acting as technical counsel, and was approved as part of the airport development program with the Federal Government assuming half of the heliport cost.

The city has now received $75,100 from the FAA as their part of the project. The city has gone beyond the original plan and has built access roads and erected additional fencing for the protection and convenience of the public, and has invested about $85,000 for their part of the heliport.

The first and so far only heliport in the United States built according to Federal sponsorship and with Federal aid, was dedicated June 23, 1960, with the expectation that scheduled helicopter service would be inaugurated at once. In this they have been disappointed.

When the heliport project was initiated in 1958 it was anticipated that twin engine equipment, for which the heliport was designed, would be available for operation at completion date. Many technical problems delayed the availability of the new helicopters.

The token service, which was all that New York Airways could provide, with the single engine Vertol 44's, was not a satisfactory proposal to the Civil Aeronautics Board, nor was it to New York Airways. It also would have been a disappointment to the travelers and shippers of the Paterson area.

The Boeing V–107 has now been approved by the FAA. The Civil Aeronautics Board notified New York Airways on February 5, 1962, that the loan on four twin-engine helicopters will be approved. Incorporated in New York Airways' application for the equipment loan is the planned service to Paterson.

Pilot training will begin with the delivery of the new equipment this spring. Service will be initiated between the air terminals this summer, followed by the Paterson and other suburban operation this fall.

There is reason to believe the CAB will soon issue the order covering the loan guarantee. Another condition in the provision of service to Paterson is the approval of the fiscal year 1963 subsidy of $5,850,000 recommended by the CAB. The provision of at least this amount of subsidy for the three helicopter operators in Los Angeles, Chicago, and New York is necessary to carry out the program.

Therefore, it is my urgent recommendation that the Congress approve the CAB budget of $5,850,000 for helicopter operators, to enable Paterson to receive scheduled air service as planned and for which they have waited so long.

Mr. THOMAS. That is a fine statement. Thank you for taking time out to give us the picture you have just presented.

FEDERAL AVIATION AGENCY FACILITY, GREATER WILMINGTON AIRPORT, DEL.

WITNESS

HON. HARRIS B. McDOWELL, JR., A REPRESENTATIVE FROM THE STATE OF DELAWARE

Mr. THOMAS. We are delighted and honored to have our distinguished colleague with us from the State of Delaware. We welcome your advice and help on the airport section of the budget for the Federal Aviation Agency.

Mr. McDOWELL. Thank you, Mr. Chairman.

The safe and efficient utilization of our airspace has recently been a subject of intense study by President Kennedy's Task Force on National Aviation Goals and the Task Force on Air Traffic Control. The reports of these study groups, submitted to the President by the Administrator of the Federal Aviation Agency in late 1961, clearly indicate that major improvements must be made to accommodate the air traffic growth which can be expected in the next decade. Particular emphasis was given to improving existing methods of air traffic control, both en route control and terminal are a control.

I appreciate this opportunity to present, for the consideration of the members of this distinguished subcommittee of the Committee on Appropriations, my views regarding the air traffic control needs, particularly as they relate to an important segment of the airways system in the State of Delaware. More specifically, I submit the following testimony in support of the installation of an airport sur-

veillance radar (ASR) facility at the Greater Wilmington Airport in the county of New Castle, Del.

It is my understanding that eastern region office of the Federal Aviation Agency had earlier recommended to the Administrator of FAA that installation of this important air traffic control facility be programed for Greater Wilmington Airport for fiscal year 1963. However, I have noted with disappointment that airport surveillance radar for terminal traffic control at Greater Wilmington Airport has not been programed nor has an appropriation for such installation been requested in the fiscal 1963 budget of the Federal Aviation Agency. Moreover, in a letter from Mr. Donald S. King, Acting Director, Aviation Facilities Service of the Federal Aviation Agency, dated January 29, 1962, I was informed that "airport surveillance radar was included in the fiscal year 1959 program for the Greater Wilmington Airport; however, prior to its installation, the Air Force drastically reduced its use of this airport to the extent that it no longer qualified for an ASR facility. As a result, the radar was reprogramed from Wilmington to another location."

While volume of operations may be a sound basis for determining installation of navigation aids and landing systems for civil airport use, it does not always lend itself to meeting a valid requirement of the military services. The military requirement is based on the mission to be performed and the need to recover mission aircraft expeditiously. This is not always compatible with a high traffic count.

The common air traffic control system in the United States, which is the responsibility of the Federal Aviation Agency, is intended to meet the needs for safe and efficient utilization of our airspace by both military and civil aircraft. The reduction in regular Air Force units at the Greater Wilmington Airport in 1958 did not obviate the need for a more effective traffic control system which would be responsive and adaptable to future civil and other military air traffic. On the contrary, the operating experience and traffic volume of the Greater Wilmington Airport since 1958, which will be analyzed hereinafter, tends to contradict the rationale used by FAA in 1959 to bypass radar installation at Greater Wilmington Airport.

Before we examine the operational data of the State's major civil airport, it would be appropriate first to review briefly the historical background of the Greater Wilmington Airport.

BRIEF HISTORY OF THE GREATER WILMINGTON AIRPORT

The Greater Wilmington Airport is an unusual and perhaps unique airport; its management officials have encountered many unusual problems and conditions which were ultimately remedied through skillful and patient efforts. At this point, I hasten to state that there are exceptionally few airports in the United States today which are not dependent upon local or State tax funds for airport operations and functions. Taxpayers of communities which financially support airports through local taxation apparently feel that such expenditures are justified in that the airport provides an essential service to the community. I am extremely gratified to report to this subcommittee that the Greater Wilmington Airport is one facility which provides this important community service with no support from current local tax revenues.

The Greater Wilmington Airport is a civilian-military veteran of service to the Nation and the Delaware community since 1941. On April 17, 1941, the Governor of the State of Delaware signed into law a bill which authorized the levy court of New Castle County to issue $500,000 in general obligation bonds for the purpose of purchasing land and for the construction of a public airport. A site was selected and construction began shortly thereafter; the Civil Aeronautics Administration participated in the initial construction. Since the airport has been used for both military and civilian functions, it would be appropriate to discuss these functions separately.

1. Military function: During World War II, the Greater Wilmington Airport, then known as the New Castle County Airport, was used exclusively by the Army Air Corps. This airport was the eastern terminus of the U.S. Air Transport Command and it was one of the busiest military airfields in the Nation until the close of hostilities in 1945. Following World War II, the Delaware Air National Guard was organized at the airport in September 1946. The Air Guard was equipped with jet aircraft in December 1950; the Delaware units were subsequently called into the Federal service in February 1951 for the Korean conflict. During the Korean action, the U.S. Air Force also leased a substantial part of the airport for use by the aircraft attached to the Air Defense Command.

In late 1952, the Air National Guard was reorganized under State jurisdiction and since that time various types of National Guard aircraft have been operating regularly from the Greater Wilmington Airport.

In 1958, the Regular Air Force and the Air Force Reserve units discontinued their activity at this airport which resulted in a substantial loss of operating revenue. At the present time, the facilities of the Greater Wilmington Airport are used frequently by U.S. Air Force aircraft for flight training purposes and for operations connected with the Air Force recovery programs.

2. Civil function: In August 1946 the Greater Wilmington Airport was returned to the jurisdiction of New Castle County and for the first time its runways were opened to civil aircraft. A temporary terminal building was constructed from surplus Army materials. On November 29, 1947, the airport was dedicated for commercial airlines' use; American Airlines was the first to provide passenger service to Wilmington followed by Eastern Air Lines, Allegheny Airlines, Trans World Airlines, and several airfreight carriers, including Capitol Airways and Zantop Airlines. With the exception of TWA and American Airlines, the carriers mentioned above still operate from Greater Wilmington Airport.

Realizing the rapid growth of the aviation industry and its importance to Delaware and to the total air transportation system, the levy court of New Castle County and the New Castle County Airport Commission issued general obligation bonds in 1954 for the construction of a new and permanent control tower and terminal building. The new terminal building, constructed at a cost of $425,000, was dedicated on August 4, 1956. This new terminal building is located

alongside one of the State's busiest highways, viz, U.S. Route 13, and it is but 12 minutes by automobile from the city of Wilmington. The airport terminal provides for a modern FAA tower and facilities for continuous operations of the U.S. Weather Bureau and it includes all passenger accommodations found at any modern terminal of comparable size in the United States. There is no question that New Castle County took an early and giant step in joining the nationwide family of progressive communities in the United States which have up-dated their air transportation facilities in the past decade.

Since the inactivation of the regular U.S. Air Force units at the Greater Wilmington Airport in 1958, the New Castle County Airport Commission has been vitally concerned as to planning future airport development to meet the growing needs of civil aviation in the State of Delaware and particularly in the Wilmington area. In this regard, the Commission cooperated in an extensive air trade study with Leigh Fisher Associates of San Francisco, Calif., whereby a master plan was advanced for the overall development of the Greater Wilmington Airport as a predominantly civil airport. Since January 1960 when the air trade study and the master development plan were made public, the management of the Greater Wilmington Airport has been active in implementing the various recommendations of the report.

Thus, in the several periods of transition from a full-time military installation in 1941 to one involving a joint military-civil function in the postwar period, New Castle County officials and the airport's management have since 1958 responded with timely measures and local initiative to restore a new balance in airport operations. Strong focus is now being directed to achieving maximum operations through safe and efficient use of existing facilities and to strengthening the fiscal bases of the airport's civil revenue-producing functions.

SELECTED OPERATIONAL DATA OF GREATER WILMINGTON AIRPORT

In analyzing the value of an airport, there are many criteria used by the Federal Aviation Agency, among others, which provide a yardstick for measurement. However, the most common measures include (*a*) the number and length of the runways, (*b*) flight activity, (*c*) airlines passengers served, and (*d*) the number of aircraft based at a given airport.

Greater Wilmington Airport serves all citizens of Delaware; it is located 6 miles south of Wilmington, Del., and it is easily accessible to about 400,000 urban and suburban people in the Wilmington-New Jersey metropolitan area. The Greater Wilmington Airport is exceeded in importance and size in Delaware only by the huge Dover Air Force Base at Dover which is located in the midsection of the State. Commercial airline service is only available at Greater Wilmington Airport since operations at Dover Air Force Base are restricted to U.S. Air Force traffic. While several small municipal and private airfields are located throughout Delaware, the Greater Wilmington Airport alone provides commercial airline passenger and air transport services which are available to industry and to residents and nonresidents of Delaware.

The following data reflect, in part, the scope of operations and facilities at the Greater Wilmington Airport:

1. Runways: The Greater Wilmington Airport maintains four runways; their dimensions are as follows:

Runway	Length (feet)	Width (feet)
North-south (instrument)	7,000	200
East-west	7,200	150
Northwest-southeast	5,000	150
Northeast-southwest	5,000	150

There is no question but that these runways are more than adequate to serve the needs of modern-day military and commercial aircraft; in fact, they compare very favorably with those available at many airports throughout the United States. It is also my understanding that turboprop engine and medium- and long-range jet aircraft have been easily accommodated on the runways of the Greater Wilmington Airport.

2. Flight activity: Flight activity is measured by total operations, each operation consisting of a landing or a takeoff. The following statistics provide a 14-year background of flight activity at Greater Wilmington Airport:

Calendar year	*Total operations* [1]	*Calendar year*	*Total operations* [1]
1948	110, 406	1955	115, 448
1949	66, 261	1956	116, 581
1950	67, 947	1957	122, 639
1951	58, 669	1958	100, 090
1952	55, 659	1959	104, 105
1953	76, 721	1960	117, 319
1954	98, 266	1961	106, 492

[1] The total operations reported include itinerant, instrument, and local operations; the latter include local flight instruction activities, engineering test flights, etc.

It will be observed that the number of operations from 1949 through 1957 almost doubled within this 8-year period; from 1958 through 1961, however, the total operations decreased to about an average of 11 percent below the high mark established in 1957. The decline in the last several years was due to the inactivation of the regular and Reserve Air Force units in 1958 and the limited commercial airline activity which stemmed from labor disputes involving Eastern and American airlines during the same year. In 1961 the instrument landing system at Greater Wilmington Airport was inoperative for 5 months because substantial improvements were being made to runways and other landing facilities.

3. Airline traffic: The following table reflects the volume of traffic at Greater Wilmington Airport from 1951 through 1961:

Year	Passengers	Pounds		
		Mail	Express	Freight
1951	17,361	122,786	362,019	346,240
1952	16,864	134,814	256,377	327,979
1953	18,536	140,059	269,839	305,844
1954	22,885	133,535	256,760	350,733
1955	31,189	156,554	275,863	556,722
1956	34,410	136,651	264,769	516,119
1957	40,011	163,393	202,510	486,760
1958	36,552	152,950	207,133	434,816
1959	44,043	167,601	251,988	485,713
1960	38,332	210,600	290,751	441,312
1961	31,936	181,699	236,022	405,327

4. Aircraft based at Greater Wilmington Airport: At the present time, there are 63 general aviation airplanes based at Greater Wilmington Airport. Of these, 16 aircraft, including several modern jet-powered airplanes, are used regularly for the transport of business executives, engineers, salesmen, etc.

Moreover, Capitol Airways, a supplemental carrier, has 13 Constellation H and G models based at Greater Wilmington Airport.

The Delaware Air National Guard, as explained earlier, also maintains a large number of jet and cargo transport airplanes in support of tactical missions and other MATS operations.

Turning now to the rationale underlying the need and feasibility for the installation of surveillance radar at Greater Wilmington Airport, I believe it would be useful to cite the governing criteria established by the Federal Aviation Agency as respects the installation of ASR. These criteria are applicable to—

(1) Large or medium hub:[1] 50,000 or more annual itinerant operations and 11,000 or more annual instrument operations, and

(2) Small or nonhub: 100,000 or more annual itinerant operations and 20,000 or more annual instrument operations.

It is interesting to note that only two small or nonhub airports in the United States meet applicable FAA criteria for ASR, namely, the airports at Charlotte, N. C., and Wichita, Kans. Moreover, only 46 airports in the Nation, including our busiest air terminals, would meet the small nonhub itinerant and instrument operations criteria.

On January 24, 1962, FAA Administrator N. E. Halaby informed all Members of Congress by letter that "air navigation facilities are placed at locations where the greatest need exists. The basic criterion is sufficient air traffic to warrant the expenditure of Federal funds."

To relate the FAA criteria vis-a-vis itinerant and instrument operations that obtain for the Greater Wilmington Airport, I present the following statistics for record and reference:

[1] Type of hub is defined in terms of airline passenger originations.

The Greater Wilmington Airport, Wilmington, Del.

Year	Itinerant operations	Instrument operations	Total [1]
Fiscal 1959	57,754	8,201	105,979
Calendar 1959	60,185	15,731	104,105
Fiscal 1960	58,220	22,350	103,990
Calendar 1960	60,732	22,749	117,319
Fiscal 1961	59,191	24,122	114,406
Calendar 1961	53,867	23,866	106,492

[1] Total operations reported also include local operations; the latter reflect flight training and engineering test activities, sightseeing air tours, etc. While local operations are not part of the criteria which are used as guidelines for the installation of surveillance radar, these activities are one of the operating factors in the safe and efficient utilization of airspace and air traffic control.

While the Federal Aviation Agency recognized, and wisely so, that it would be necessary to vary at times from established criteria, this Agency has installed or is now installing airport surveillance radar at airports which fall far short of the programing criteria. I submit for the record a short list of the airports involved which provides a comparison of their traffic with that of Greater Wilmington Airport for the fiscal year 1961:

Airport	Hub type	Operations		
		Itinerant	Instrument	Total
Wilmington, Del.	Nonhub	59,191	24,122	114,406
Albany, N.Y.	Medium	58,438	27,093	80,302
Roanoke, Va.	Small	53,419	22,798	83,220
Binghamton, N.Y.	do	39,772	15,849	48,316
Wilkes-Barre, Pa.	do	31,266	15,610	51,025

It is, therefore, highly singular that ASR facilities have been programed and installed at certain small hub airports which do not meet existing FAA criteria while at the same time Greater Wilmington Airport was deleted from programing notwithstanding the fact that itinerant and instrument operations thereat are far in excess of those reported above for airports located in Roanoke, Va., Binghamton, N.Y., and Wilkes-Barre, Pa.

Earlier I had stated that the Greater Wilmington Airport is a unique airport. The transition from military to civil use in the late 1940's, the joint military and civil operations during a major part of the 1950's, and presently, its fundamental reliance on civil functions, have tended to create unusual conditions at this airport. Moreover, other unusual aspects exist which further support the need for the installation of ASR at Greater Wilmington Airport, a brief explanation of these aspects follows next.

UNUSUAL CONDITIONS WHICH OBTAIN AT THE GREATER WILMINGTON AIRPORT

1. Enroute traffic: The Greater Wilmington Airport is located directly on the airway between Philadelphia, Baltimore, and Washington, D.C. Traffic on this particular airway is quite heavy. The Greater Wilmington Airport is also near the huge Dover Air Force Base at Dover, Del., about 45 miles south of Wilmington, Del. Under

instrument conditions, landing and departing aircraft are frequently delayed because of enroute traffic. Since this traffic does not land at Wilmington, it is not reflected in airport traffic statistics. It is, nevertheless, a major factor in traffic control problems affecting Greater Wilmington Airport; surveillance radar would permit safe operations to and from this airport without excessive delays.

2. Business aircraft use: There is an unusual amount of business aircraft activity at the Greater Wilmington Airport. This is explained in part by (*a*) the meager airline service at Wilmington, and (*b*) the large number of out-of-State companies which are incorporated in Delaware, many of which provide their own private aircraft for air transportation to Wilmington for annual corporate and stockholders' meetings. For example, the Bethlehem Steel Corp. held its annual corporate meeting in Wilmington, Del., on April 10, 1962; six executive aircraft operated by Bethlehem Steel transported various executives of this corporation to Wilmington, Del. These airplanes, DC-3's, Lodestars, and Convairs, landed at and departed from Greater Wilmington Airport.

Aircraft operated by Coca Cola Co., Continental Can Co., General Motors Corp., and scores of other large and small corporations transport their executives and employees via private airplanes which land and take off from Wilmington.

Other large corporations, with administrative offices in Delaware, own and operate their private aircraft from the Greater Wilmington Airport. For example, Hercules Powder Co., 910 Market Street, Wilmington, Del., reported that their airplanes made the following flights from Greater Wilmington Airport during 1961:

Type of aircraft	Flights	Passengers
DC-3 580	194	839
DC-3 583	161	698
Convair O2H [1]	76	353

[1] From July 1, 1961, to Dec. 31, 1961.

As of March 1, 1962, Hercules Powder Co. has added a four-engine Lockheed Jet Star to its fleet of business aircraft located at Wilmington, Delaware.

As part of my remarks, I include a letter from Mr. Donald R. Redpath, vice president of the Atlantic Aviation Corp., Greater Wilmington Airport, Wilmington, Del. which is dated January 15, 1962, and addressed to Mr. George Bean, manager of the Greater Wilmington Airport, which reflects the volume of air traffic generated by this organization from Wilmington. In his letter, Mr. Redpath indicated that:

> I think you can see that we are making good use of the airport facilities and you can also see the need for and the value of a radar installation which would considerably improve the safety of arrivals and departures. * * * I believe we are all aware of the importance of having such a safety item available particularly during the months when we have thunderstorm activity since the aircraft could be safely vectored around the thunderstorm activity.

The movement of people in business aircraft is of considerable economic importance to the Nation and to the State of Delaware; it is certainly as important as that of the commercial airlines. Many

corporations today own and operate business airplanes the cost of which exceed a capital outlay of several million dollars. These airplanes and their value in the daily conduct of interstate commerce and trade in the United States are just as important as the activities of commercial airlines. Certainly, enhanced safety through effective air traffic control is clearly a primary aviation goal, relating to life and property, both of those who engage in aviation activities and of third parties as well.

3. Irregular airline activity: Considerable traffic is generated by supplemental carriers based at the Greater Wilmington Airport, including Capitol Airways and Zantop Airlines.

Capitol Airways operates its main overhaul and maintenance base at Wilmington; Capitol now has 13 super Constellations based at the airport. Greater Wilmington Airport is of prime importance to Capitol's operation not only because it is the company's only maintenance and overhaul base for these aircraft but the facilities of the airport are used for pilot training purposes. It is expected that Capitol Airways will operate about 100 nonmilitary charter flights per month in mid-1962 in addition to military chartered operations.

Zantop is an air cargo carrier that provides service for the automobile industry. It operates a regular shuttle service between Detroit and Wilmington, Del., carrying freight for the Chrysler and General Motors automobile assembly plants in the Wilmington area. Since the bulk of auto freight moves by truck and rail, it is obvious that the cargo moving by air is of a somewhat urgent nature and the shippers must rely upon a dependable delivery schedule to avoid costly assembly line shutdowns.

4. Military: Military activity should be considered as a factor contributing to the need of surveillance radar at Greater Wilmington Airport. For example, the Delaware Air National Guard is now flying F–86 jets in support of the Strategic Air Command missions; however, the guard will soon convert to C–97 troop transports. This will involve flights carrying large numbers of military personnel.

Another activity at Greater Wilmington Airport is the U.S. Air Force air recovery program which was established to provide for operational bases for military aircraft at civilian airports in the event of destruction of military airfields during a national emergency. An Air Force recovery squadron is located at Greater Wilmington Airport and there is no question that surveillance radar would be of considerable value to this important military mission.

Moreover, due to Wilmington's close proximity to military airfields, viz, Dover Air Force Base, Del., McGuire Air Force Base, N.J., and Bolling Field, Washington, D.C., for example, many military pilots from these airfields use the Greater Wilmington Airport for training purposes, particularly for instrument training. Surveillance radar would provide greater safety for these flights; it would also enable these pilots to familiarize themselves with the use of short-range radar and other existing navigational aids thereby enhancing the value of such pilot training which is vitally important to our strategic and tactical air missions.

CONCLUSION

One fundamental problem in aviation today is that concerned with the movement of an airplane safely and swiftly from point A to

point B. Each airplane, regardless of owner or operator, is a unit requiring adequate and effective control.

In the foreword to the publication "Airway Planning Standard No. 1," a brochure which explains the criteria for the establishment of air traffic control aids, the Federal Aviation Agency provides that—

> The criteria contained herein shall be used as a guide for determining present and future programs but do not, of course, cover all problems which may arise. The criteria are not to be considered as inflexible and unusual conditions may justify exceptions.

With the increasing requirement for additional landing areas throughout the Nation, on the one hand, and the need to attain the highest safety and operating standards at existing terminals on the other, I feel that unusual conditions do exist at the Greater Wilmington Airport which warrant the installation of surveillance radar.

I, therefore, support the initial recommendation submitted by the eastern region office of the Federal Aviation Agency for the installation of surveillance radar at Greater Wilmington Airport. I strongly believe that it would be most logical and economical in the long run to have an optimum, modern air traffic control system built on the substantial foundation of the airport's present system and that such installation will serve a broad and important public purpose.

I respectfully urge the distinguished members of this subcommittee of the Appropriations Committee to provide the funds for an appropriate radar installation at this airport for the fiscal year 1963.

Thank you, Mr. Chairman.

Mr. THOMAS. That is a compelling and complete statement. Thank you very much for the time you have taken to come to see us.

Mr. MCDOWELL. Mr. Chairman I have a letter from the vice president of Atlantic Aviation Corp. to the manager of the Wilmington Airport I would like to submit for the record.

Mr. THOMAS. We would be delighted to have it.

(The letter follows:)

JANUARY 15, 1962.

Mr. GEORGE BEAN,
Airport Manager, Greater Wilmington Airport,
Wilmington, Del.

DEAR GEORGE: I know you have been compiling some figures on passenger flight activity at the airport and I thought you might be interested in what our operation looked like for 1 month last year which is more or less typical of our pattern of operation.

During June, we carried a total of 534 passengers in the airplanes our flight department regularly operates here and in addition to that we carried 97 charter passengers. In our flight department, we conducted, during that same month, 207 separate training flights. With this kind of activity, I think you can see that we are making good use of the airport facilities and you can also see the need for and the value of a radar installation which would considerably improve the safety of arrivals and departures during such months as we outlined above.

I believe we are all aware of the importance of having such a safety item available particularly during the months when we have thunderstorm activity since the aircraft could be safely vectored around the thunderstorm activity.

If there is any other traffic information concerning our operation which you might like to have, please do not hesitate to ask us.

Best personal regards.

Sincerely,

ATLANTIC AVIATION CORP.,
DONALD R. REDPATH, *Vice President.*

WITNESS

HON. FRANK C. OSMERS, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. THOMAS. Gentlemen, we have with us this morning our very able and distinguished colleague from New Jersey, Congressman Frank Osmers. Mr. Osmers is well and favorably known to the committee. It is a pleasure and an honor to have you with us. We will be delighted to have the benefit of your advice and judgment on anything in which you are interested.

Mr. OSMERS. Thank you, Mr. Chairman. It was my hope that the Honorable S. Bradford Menkes, an elected member to the Township Council of Teaneck, N.J., would be here this morning to testify in person with respect to shelter programs. Mr. Menkes is a distinguished educator at the School of Technology at the City College of New York, as well as a leading public-spirited citizen of Teaneck.

Unfortunately, it was not possible for Mr. Menkes to come to Washington today because of other commitments. At my request, he has forwarded to me a brief statement setting forth his views on fallout shelters.

In my opinion, Mr. Menkes has made an excellent statement, and I respectfully request that it be placed in the record of these hearings at this point.

Mr. THOMAS. We will be delighted to have it.

(The statement referred to follows:)

STATEMENT BY HON. BRADFORD MENKES, COUNCILMAN, TOWNSHIP OF TEANECK, N.J.

INTRODUCTION

Thank you for the opportunity to present this statement. My own interest in the general subject of fallout shelters dates back about 4 years. It is the result of the blending of various professional activities. In addition to being an associate professor of mechanical engineering at the City College of New York, I am a consultant to the United Nuclear Corp. I am also a member of the governing body of the township of Teaneck. I do not, however, speak here today as a representative of any of these organizations.

In June of 1961 I scheduled a series of talks to begin in September 1961 on the subject of "The Destructive Capabilities of H-Bombs." This action was motivated by an awareness on my part that the average citizen had very little appreciation of the awesome potential inherent in a thermonuclear war. At about the same time I started construction on a family fallout shelter in the basement of my home.

The events of the summer of 1961, including the Executive order of the President which transferred responsibility for the shelter program to the Department of Defense, the Berlin crisis, and the sudden interest in fallout shelters, all preceded the first talk I had scheduled. Then came the series of Russian bomb tests. Against this backdrop of world events, my little series of talks took on added significance. They attracted considerable local interest. I have submitted a series of newspaper clippings as evidence of this interest, as exhibit 1.

I am here today primarily to report to you the results of conversations with many people in my quadruple capacity as a member of local government, as an engineering professor, as a nuclear consultant, and as one who has built his own family fallout shelter.

THE GREAT DEBATE

You gentlemen are certainly aware of the fact that the subject of fallout shelters stirred up more interest and debate than any similar topic in many years. Distinguished scientists, from Dr. Libby to Dr. Pauling, philosophers, physicists,

reporters, and the average lay citizen offered widely diverging opinions on the merits of a fallout shelter program.

Most of these people used data based on Glasstone's work (reference 1) to substantiate their arguments. The hearings of the Holifield subcommittee (reference 2) provided another major source of data. What it reduces to in the final analysis is that by making widely varying initial assumptions, widely varying conclusions can be reached.

You may profitably explore the psychological reasons behind the arguments and the intense interest. I believe that they stem from the dreadful realization by many people, for the first time, that an attack by an aggressor nation against the American heartland was a possibility.

For years practically everyone has subscribed to the notion that the doctrine of "massive retaliation" as voiced by the late Secretary of State, John Foster Dulles, was an effective deterrent to any potential aggressor nation. This lulled the average man into a sense of security, disturbed only momentarily from time to time by certain Soviet scientific achievements with possible military implications.

Three books laid the foundation for a change in our popular awareness. These were written by Herman Kahn (reference 3), Major de Seversky (reference 4), and Bertrand Russell (reference 5). The national defense plan, which included a suggestion that families build individual fallout shelters, dates back to the days of the OCDM. But the article which appeared in Life (reference 6), with a covering letter by President Kennedy, had a terrific impact.

Thus was born the understanding that a deterrent could fail, and that if it failed the result could be a devastating attack on this country itself.

The popular reaction to the suggestion that families should build individual fallout shelters was very mixed. To some the idea was most distasteful because it seemed an admission that war was possible, and thus lent reality to a nightmare. Others rejected the shelter concept because they felt that shelters were futile. Still others objected because they visualized families separated at a moment of attack, with a part of the family unit able to gain shelter and the rest unable to do so. The owner of a family shelter has also been portrayed as standing at the door of his shelter with a gun to bar intruders.

Those citizens who did start out to build shelters found conflicting advice as to how they should be designed. Government specifications did not distinguish between shelter requirements in different physical locations. And there existed no official agency competent to give advice.

The popular conclusion has been enhanced by the activities of groups which have sought to achieve an international ban on nuclear testing. No one can disagree with the argument that if there were no thermonuclear weapons there could be no thermonuclear war. But the question of tests in the atmosphere have become inextricably entangled with the decision to be made regarding fallout shelters.

THE WORLD SITUATION

I am going to assume that the members of this subcommittee are entirely familiar with the extent of the offensive and defensive capabilities of the United States. I also assume that you have, within the limits of intelligence information, a similar knowledge with respect to the capabilities of Russia. My own knowledge must be less than yours, because it rests entirely on publicly available sources.

An outline of my understanding of this information is contained in exhibit 2, submitted herewith. This material has been taken from newspapers, magazines, and reports of hearings before various congressional committees.

The following facts are inescapable:

1. An unprecedented capacity for destruction is possessed by both the United States and the Soviet Union. To a lesser extent other countries share in this capability.

2. There is a grave problem of communications between these two countries. There is a mutual distrust which seems impossible to overcome. The disheartening conclusion to the months of negotiation at Geneva is a prime example. In a total disregard of world public opinion, the Soviet series of bomb tests demonstrated that elaborate preparations for the test series must have proceeded concurrently with the talks at the conference table.

3. There is a tendency to downgrade Soviet scientific achievements which is in disagreement with the facts.

4. Some risk of war will now always exist, whether through deliberate intent, accident, insanity, or miscalculation.

5. Depending on the assumptions which are made as to the nature of a possible attack, such as the weight and distribution of the attacking weapons, the amount of previous warning, and the extent of prior preparation, the possible effects to this country can vary between wide limits.

6. It appears to be axiomatic that the United States would not strike the first blow in a thermonuclear war.

7. A decision as to whether or not shelters are required is one which just cannot be made by the average citizen. It is a military decision to be made by the Department of Defense. It requires information unavailable to anyone else.

SHOULD SHELTERS BE BUILT

I have just indicated that this is a decision which ultimately must be made by the Department of Defense, with the approval of the President and the Congress. It is not under any circumstances a decision to be handled on a do-it-yourself basis by the man in the street.

I would like to offer only this observation. It has been said that the building of shelters is provocative to war. I cannot believe that the building of 145 ATLAS missiles, 180 TITAN missiles, or 800 MINUTEMEN is in any sense less provocative than the building of shelters. I firmly believe that any steps taken by this country which would render a possible attack on this country less effective or less damaging could never be provocative to war. And shelters certainly are as much a part of the overall deterrent picture as any other component of a warning system.

COMMUNITY SHELTERS

Assuming that a decision has been made by the Department of Defense that it is a good idea to have fallout shelters, certain observations are very pertinent which bear directly on this request for funds.

There is no question whatsoever, speaking as an engineer, that shelter for every individual in this country can be provided. There is equally no question that adequate prior preparation can minimize substantially the results of a possible thermonuclear attack.

Far more attention to routine specifications is indicated. It will be necessary for the Department of Defense to set down construction specifications in technical terms which will vary, depending on the region of the country and the nature of the site, considered as a possible target to an aggressor.

For example, a successful shelter in New York City might be required to withstand 100 pounds per square inch overpressure, have a protection factor of 10,000, and have its own air supply. A shelter in a remote rural area might have very rudimentary requirements. It is just not possible to talk in terms of the same shelter specifications everywhere in the United States.

A reluctance to pinpoint probable targets may be the reason why this has not yet been done. But it is a must to a reasonable shelter program. There is also no need whatsoever for people to throw up their collective hands and stop living. We should do what has to be done to deter a war, and then proceed with our daily lives as before.

Community fallout shelters, at least partially financed by the Federal Government, have the inherent following advantages:

1. They are less expensive, on a cost-per-person basis, than individual shelters.

2. They offer the possibility of combining under one roof, several different skills which would be most useful in a postattack environment.

3. They lend themselves to dual-purpose construction, which can make them economically justifiable.

4. They do not carry the onus of self-interest which is associated by the public with the construction of individual shelters.

5. They avoid the real problem that only the wealthy or dedicated can provide individual shelters for themselves, while their less fortunate or less dedicated neighbors look on in envy or disdain.

6. Design specifications and construction practices are more easily regulated.

7. They are more practical for use in heavily populated urban and suburban areas than individual shelters. It may be emphasized that—

(*a*) many people do not live in private homes;

(*b*) if an attack were to occur during a business day, many people would be at work or school, far from their homes.

8. A properly conceived program will eliminate the idea of a do it yourself approach to civil defense.

It should be emphasized that there will be many problems connected with the design and construction of community fallout shelters. The size of the shelter, and its location, is related to the kind of target area, the possible extent of prior warning, and whether or not people should be in the shelter before the attack. Other problems exist in the safeguarding of stores, and in the establishment of a shelter government in the event of an emergency. There is a clear need for trained leadership at the Federal level to handle such problems.

Above all, the decision as to whether shelters should be built at all which must preface all of the above, is a decision which just must be made by the Department of Defense. Whether they should be built in a particular section of the country must also be determined by the Department of Defense. Actual positioning and planning can be done by local authorities, but it will require technical assistance from knowledgeable people.

And last, but not least, in my view community shelters do not preclude the building of family shelters. The family is a natural unit together about half of each day in the home. The very fact of short warning times should indicate the basic need for individual shelters. They should be at least partly subsidized by the Federal Government, and much more sensibly specified than at present.

REFERENCES

1. Samuel A. Glasstone, "Effects of Nuclear Weapons."
2. JCAE hearings, 1959.
3. Herman Kahn, "On Thermonuclear War."
4. Alexander de Seversky, "America Too Young To Die."
5. Bertrand Russell, "Commonsense and Nuclear Warfare."
6. Life magazine, September 7, 1961.

Indirect Cost Limitation on Research Grants

STATEMENT OF REPRESENTATIVE GEORGE MEADER OF MICHIGAN

Mr. Thomas. Next we have a statement from Congressman George Meader of Michigan on indirect cost limitation on research grants which we will insert in the record at this point.

(The statement referred to follows:)

Statement of Hon. George Meader in Opposition to a 15-Percent Indirect Cost Limitation on Research Grants

Mr. Chairman, I urge the subcommittee to refrain from inserting in the independent offices appropriation bill a provision limiting indirect, or administrative, costs to 15 percent of direct costs on research grants made by agencies covered in the bill.

No such rigid limitation should be imposed upon vital research programs in atomic energy, space, and science without full and careful exploration of its possible consequences and implications and hearing the views of Federal officials charged with administering expenditures for such research programs and the views and experiences of representatives of the institutions where the work is done.

Unfortunately your hearings had been concluded before those opposed to the percentage limitation were aware of the possibility of its inclusion. Accordingly, I appreciate your gracious consent in your letter of May 14, 1962, to include this statement in your record.

1. A percentage limitation of indirect costs on Federal research grants is an unsound approach

The Federal Government's expenditures in research are huge ($12½ billion estimated for 1963) and growing. About a billion dollars worth of this research is being done in the institutions of higher learning of the country, of which it is estimated 80 percent are receiving Federal research funds.

Much of this research is done on contract, where the item of indirect costs is negotiated on an institution-by-institution basis under Budget Bureau Circular A–21, with due regard to the nature of the institution's operations and the accounting system by which its business transactions are recorded.

The percentage limitation has been applied only to grants which dollarwise are small compared with contracts. For example, the Defense Department appropria-

tion bill contained a 15-percent limitation of indirect costs on grants for the first time this year. Research grants totaled $40 million in the Defense bill as compared with over $300 million for research contracts.

A percentage limitation on indirect costs is meaningful and workable only if the base to which the limitation is applied is uniform among institutions receiving research grants; only if they conduct their operations and record their business transactions and maintain their accounting systems in an essentially uniform way.

Is there such uniformity?

Institutions of higher learning vary widely in size, in character, and in the manner of conducting their operations and recording their business transactions. Some are supported by States or cities, others by churches and religious groups or orders, and others by private endowment. State legislatures, governing bodies, and donors may require or influence the manner of conducting and recording their business transactions.

A large institution might have developed an elaborate cost-accounting system charging supplies, equipment, and services directly to a department doing research work. Thus its direct costs would be a high proportion of total costs. Fifteen percent of direct costs might be more than compensation for overhead.

A small institution, on the other hand, might not see fit to maintain a costly and elaborate cost-accounting system, and direct costs might be a relatively small portion of total costs. In this case 15 percent of direct costs would reimburse only a fraction of the out-of-pocket expense of supporting a research project.

It all depends on how the institution operates and keeps its books.

The National Science Foundation interim report of March 1962 in its study of indirect costs of research in colleges and universities made this comment:

"PROBLEM OF UNIFORMITY

"When an attempt is made to compare indirect cost rates of individual institutions, difficulties arise from the lack of common denominators in both the items to be charged as indirect costs and the items comprising the direct cost base. Each institution has its own characteristic fiscal structure, and, consequently, procedures vary for handling certain allowable costs in the computation of indirect cost rates. Problems of applying uniform statistical methods to a large number of individual variables of cost were great. In this study, it has not been completely possible to rule out or establish controls over the institutional differences in accounting for identical items of costs. A highly selective statistical procedure was necessary if the important recorded items of cost were not to lose significance through scattering.

"By means of Circular A–21, one of the most widely used and tangible measures of indirect costs, significant items of costs were identified and a uniform system was established in the schedules for recording these major costs. By adjusting for certain costs such as employee benefits, reasonable common denominators were obtained for both the direct and indirect cost bases.

"It should be emphasized at this point that caution must be exercised in making direct comparisons of the levels of R. & D. indirect cost rates of large versus small schools. Since the method and procedures used in computing the rates for small schools differ from those employed by the large institutions, a number of technical accounting adjustments would be necessary in order to standardize and compare the computations for the two groups of institutions. To this extent, therefore, the indirect cost rates of the small schools cannot be compared directly with those of the large schools."

The only way to achieve uniformity would be for the Federal Government to establish criteria and standards for a uniform pattern of accounting systems, including a clear definition of direct and indirect costs and require its adoption by institutions of higher learning receiving research grants. This clearly would be an invasion by the Federal Government into the area of business-management decisions of institutions of higher learning (since accounting systems are devised merely to record business transactions and decisions) and would lead inevitably to Federal interference, if not supervision and control of important areas of management of institutions of higher learning.

This would impair the freedom of research, increase the paperwork (and the business staffs to handle the same) and possibly induce the establishment of expensive cost-accounting systems not heretofore regarded as necessary or appropriate in the higher educational field.

It could lead to distortion of educational and research programs of universities because of the predominant financial influence of Federal contributions to research. It could impair the vitality and rate of progress of educational and research programs of institutions of higher learning.

In turn, that could harm the Federal Government's own important activities and objectives in scientific research and development.

A far more intelligent approach to prevent abuses in charging for the administrative overhead costs for performing research for the Federal Government is provided by Bureau of the Budget Circular A–21, which established principles for computing indirect costs on research. This circular provides for assessing indirect costs on an institution-by-institution basis subject to audit by Federal agencies responsibile for allocation and administration of research work.

This Budget Bureau circular starts out by recognizing the wide variety in character and size of institutions working on research grants, and does not seek to alter the accounting system used by the institution for the conduct of its day-to-day business and its educational and non-Federal research responsibilities.

Bureau of the Budget Circular A–21 provides flexibility in control. The rigid 15 percent limitation on indirect costs does not.

Under "Policy Guides" the Circular recites:

"*a.* Each college and university has its own unique combination of staff, facilities, and experience, and should be encouraged to conduct research in a manner consonant with its academic programs and institutional objectives while fulfilling its contractual responsibilities."

* * * * * * *

"*d.* It is not intended that the application of these principles should require any significant changes in the generally accepted and established accounting practices of colleges and universities."

The 15 percent indirect cost limitation imposes rigidity and logically is workable only if a uniform pattern of accounting and a uniform definition of direct and indirect costs is forced upon universities and colleges by the Federal Government.

2. Fifteen percent of direct costs is not compensatory for overhead expenses

The interim report of the National Science Foundation, included as appendix A, is based upon a survey of 200 colleges and universities engaged in research and development sponsored by Federal agencies during the fiscal year 1960. After making certain adjustments (to allow for differing accounting systems) the National Science Foundation concluded that the average of indirect costs of Federal research and development was 28 percent of direct costs in large colleges and universities and 32 percent for the 82 small schools; that is, those having less than $250,000 in direct costs for Federal research and development.

Thus it appears that the 15 percent limitation would reimburse institutions doing research for the Federal Government for only about one-half of the out-of-pocket costs incurred by them for the conduct of research programs of the Federal Government.

3. Tacit assumptions

The source of the drive to impose a 15 percent limitation on indirect costs of Federal research grants is somewhat obscure. It seems to proceed from a belief that universities are enriching themselves and running their institutions on Federal research funds—that there are at present no controls upon the amount universities are permitted to charge for their administrative overhead or so-called indirect costs, and that while a percentage limitation may be a somewhat unskillful device, it is imperative that some control be imposed by the Congress to keep the matter from getting out of hand.

Those holding this view have failed to cite any single example of a university's enriching itself, far less any widespread abuses among the college community generally.

There is no basis for the assumption that universities are making money on these Federal research grants. On the contrary, Government audited figures showed, for example, that for fiscal year 1961 the University of Michigan spent on indirect costs for research for Federal agencies $1½ million more than the amount for which it was reimbursed by the Federal Government.

Harvard in its report "Harvard and the Federal Government," noted that in 1959–60 "the university incurred $687,500 in unreimbursed indirect costs."

Dean Ralph A. Sawyer, vice president in charge of research at the University of Michigan, has testified frequently in opposition to the rigid 15 percent indirect cost limitation. He recently appeared before the Health, Education and Welfare Appropriations Subcommittee of the Senate, and I include his statement on this subject as appendix B.

It is my hope that the subcommittee will withhold action on imposing a rigid 15 percent limitation on indirect costs in the current independent offices appropriation bill until the matter can be more thoroughly studied.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESSES

DR. EDWARD BEVILACQUA
EDWARD F. SNYDER, EXECUTIVE SECRETARY OF THE FRIENDS COMMITTEE ON NATIONAL LEGISLATION
MISS FRANCES NEELY, FRIENDS COMMITTEE ON NATIONAL LEGISLATION

Mr. THOMAS. The committee is next privileged to hear Dr. Edward Bevilacqua of the Friends Committee on National Legislation who wishes to speak on civil defense.

Mr. SNYDER. My name is Edward Snyder. I am executive secretary of the Friends Committee on National Legislation here in Washington.

This is Miss Neely of our staff, and this is Edward Bevilacqua, of New Jersey, who is to submit the statement which our committee has.

Mr. THOMAS. Do you have any relatives in Texas by the name of Bevilacqua?

Dr. BEVILACQUA. It is possible, but I am not acquainted with them, if I do.

Mr. THOMAS. You may have some very distinguished kinsmen down there. The old-timers came from Italy a hundred years ago. Are you of Italian extraction?

Dr. BEVILACQUA. Yes. My family came to this country much more recently than that.

Mr. THOMAS. Doctor, we are delighted to have you with us, as well as your staff. It is nice to have Miss Neely and Mr. Snyder with us. We welcome all three of you.

Dr. BEVILACQUA. I would like to submit a statement for the record and also to speak about parts of it.

Mr. THOMAS. Doctor, you might give us something on your background before you start.

Dr. BEVILACQUA. My name is Edward Bevilacqua. I live in New Jersey. My training has been in chemistry. I have an undergraduate degree from Rensselaer Polytechnic Institute and a Ph.D. from the University of Wisconsin. I am engaged in research in industry.

Mr. THOMAS. How old are you?

Dr. BEVILACQUA. Forty-one.

I have recently been the coauthor of a series of articles which appeared in a newspaper in my area, the Bergen Evening Record, dealing with this question of civil defense. The title of the series was "Are Shelters the Answer?" An interesting aspect of this was that there was no adverse reaction to the series in which we concluded that shelters are not the answer. We seemed to represent the public opinion very closely in our analysis of the value of civil defense and of fallout shelters. In order to find any adverse comment at all, the newspaper had to solicit remarks from the civil defense director of the county in which the paper circulated.

I think this probably is representative of the attitude, at least in our part of the country, toward civil defense and fallout shelters as a means of meeting the problems that face us.

My statement today is presented on behalf of the Friends Committee on National Legislation as well as out of my own concern. The Friends Committee is not a spokesman for all members of the Religious Society of Friends but it does represent the views of many concerned Friends. It recently adopted a statement on civil defense, a copy of which is attached to this statement of mine and I hope it may be entered into the record of these hearings together with an attached statement of the American Friends Service Committee.

As you may have gathered, I am here to oppose the appropriation of funds for the greatly increased civil defense activity which is contemplated by the Defense Department. I would like to talk particularly about the large amount for shelter incentives and for marking and stocking existing shelters.

Mr. THOMAS. We will be delighted to have your views on that subject. We are very much interested in that, I can assure you.

Dr. BEVILACQUA. We oppose this appropriation for several reasons but most importantly it represents a large expenditure for war effort when what we really need is an increased expenditure for peace. It represents a diversion of funds and effort which can be usefully spent in other ways, ways which could lead to peace. Perhaps equally important, this $450 million odd, is the opening wedge for a continually expanding program. The proposed program as it stands will not protect the populace and it can be deceiving, insofar as it leads anyone to believe he can, as an individual, survive a nuclear war.

It is a new way of expanding the war effort and as a result carries with it the same dangers of increasing the likelihood of war as any of the other programs which are intended to improve our military posture.

If this administration appropriates large amounts for civil defense, it would indicate this Government has increased its estimate of the probability of nuclear war.

The Secretary of Defense's covering letter in which he forwarded a proposal bill to authorize this expenditure talks about $450 million for the incentives program, in fiscal 1963. But in his testimony before the House Military Operations Subcommittee the Assistant Secretary of Defense for Civil Defense, Steuart Pittman has made it clear that this is only the opening wedge. For example, he says:

> A shelter system will take time to develop, as will training and organization of people to use the shelters; hence our program is designed to bring the lowest cost shelter space into operation, first. This eases the initial financial impact of the program on all participants.

In that statement he went on to say that the total contemplated expenditure for this aspect of the shelter program was between $5 billion and $6 billion, of which the Federal Government was expected to contribute about one-half over a 5-year period.

Mr. THOMAS. Yes, we are familiar with that part.

Dr. BEVILACQUA. Aside from the factor of cost there is this problem of the intrusion of the military into the daily lives of every person in the country. As Mr. Pittman said, you have to train and organize people to use the shelters. How can you train and organize the whole population of the country to use shelters automatically, on warning, unless you intrude into their daily lives, with drills and training which call for an automatic response to a signal?

There is furthermore the point that shelters may not decrease the danger of war but increase it.

In the first place, if our potential enemy sees that we are engaged in a serious shelter program, as this is likely to become if it continues to grow, he would begin to wonder about our intentions. Because when we start to protect our people against the effects of a counterblow, obviously he will become suspicious. So that at the minimum we will have a new form of arms race and at the maximum we increase the danger that our enemy may get nervous about our intentions and decide that it is necessary to make a first strike for his own protection.

I mentioned the inadequacies of the program. Obviously the current program provides for only a small fraction of the total population. Beyond that, the shelter space which is being marked and stocked or would be built under this incentive program is concentrated in downtown areas in large cities. It is not really related to the distribution of the populace. Furthermore, it makes no provision for what are likely to be the most important effects of a nuclear attack: Blast and fire.

But when the Federal Government starts a widespread program, of labeling, stocking, and constructing shelters—there is a possibility the people will be misled into believing that they are actually protected. And if they are so misled they are more likely to accept nuclear war as a way of solving the problems that we face.

I think I would like to close by reemphasizing the first point I made: There are many, many better ways to use the funds than to spend them for fallout shelters. Ways that show genuine concern for people as individuals. This $450 million, for example, would be sufficient to build 10 to 20 schools in every State in the Union. It could be used to retrain and relocate workers in perennially depressed areas like in West Virginia, for example. If it were used abroad it could build homes for a million families that are now homeless. It could provide food for a year for a million people who are now starving. It could be saving lives instead of being spent in futile search for safety.

Why not use the money to expand the Peace Corps tenfold instead of only doubling it?

Why not put it to work through the U.N. to help undeveloped areas help themselves?

Why not put substance into the Arms Control and Disarmament Agency and develop a research organization at least as large as those which now serve the Department of Defense.

The only real defense against nuclear attack is to abolish war. It is to this that we should be mobilizing our efforts and spending our funds.

Mr. THOMAS. Doctor, you have made a most appealing statement and we will always be grateful to you. We appreciate your taking time and effort to express your thoughts so succinctly and in a very clear manner. We thank you and your staff very much for coming. You have been very helpful.

(The prepared statement and attachments of Dr. Bevilacqua follow:)

STATEMENT OF EDWARD M. BEVILACQUA ON BEHALF OF THE FRIENDS COMMITTEE ON NATIONAL LEGISLATION

Mr. Chairman and members of the committee, my name is Edward M. Bevilacqua. I live at 76 Knollton Road, Allendale, N.J. I am a graduate of Rensselaer Polytechnic Institute and hold a Ph. D. in chemistry from the University of Wisconsin. My profession is industrial chemical research.

As a member of the Scientists' Committee on Radiation Information I am now conducting an adult education course titled "Radiation and Life" in the high school, in Paramus, N.J. With Jesse A. Mock I have written a series of newspaper articles under the title, "Are Shelters the Answer?" which appeared in the Bergen Evening Record, Hackensack, N.J., in February of this year. I am chairman of the Peace and Service Committee, Ridgewood, N.J., monthly meeting of the Religious Society of Friends.

This statement is presented on behalf of the Friends Committee on National Legislation as well as out of my own deep concern as a private citizen. The Friends Committee on National Legislation is not an official spokesman for all the members of the Religious Society of Friends, but is an independent organization reflecting the views of many concerned Friends. At its annual meeting in Washington, D.C., in January 1962, the General Committee of the Friends Committee on National Legislation approved a statement on civil defense which is appended to this testimony. I hope it will be included in the printed report of these hearings, as well as a statement by the American Friends Service Committee.

Today I am here to oppose the appropriation of funds for greatly increased civil defense activity. My remarks are directed particularly to the provisions in the budget for shelter incentives and for marking and stocking existing space, but apply equally well to the entire concept of expanded Federal sponsorship and participation in fallout shelter construction.

Specifically, we oppose this expansion because—

1. It represents a diversion of funds which can be more usefully spent in other ways, spent in the cause of peace.
2. It is the opening wedge for still further growth, which can lead eventually to military intervention in the daily life of every citizen.
3. The proposed program is of little value for the protection of the populace, and is therefore deceiving, insofar as it suggests to people that they can survive a nuclear war.
4. It is a new and novel expansion of the war effort, carrying with it the same increased danger of war that any disturbance of the balance implies.
5. Embarkation on a large-scale civil defense program means that the Government has increased its estimate of the probability of nuclear war.

VAST SPENDING PROGRAM REQUIRED FOR CIVIL DEFENSE

The Secretary of Defense has estimated the cost of the shelter incentives program at $450 million for the first year, exclusive of costs of administration. He estimates further that this program should result in enough construction to protect "substantially all of the population against fallout radiation in about 5 years" at a total cost of between $5 and $6 billion. The Federal Government expects to contribute about one-half this sum.

But this represents only the opening wedge, the beginning of requests for what may become astronomical sums. In his testimony before the House Military Operations Subcommittee February 19 of this year, Steuart L. Pittman made this clear. For example, point 7 of his outline of the framework of a civil defense system says:

"A shelter system will take time to develop, as will training and organization of people to use the shelters; hence, our program is designed to bring the lowest cost shelter space into operation first. This eases the initial financial impact of the program on all participants."

If this request for funds is granted there will be larger requests for expenditures the next year, and the next, and the next. The proposed program is obviously inadequate to save lives in the event of a nuclear war. Once a shelter program is started there will be growing demand for converting to a more protective system, designed to cope with blast and fire effects. Urged on by a construction industry with a vested interest in an apparently unlimited expansion potential and by the growing bureaucracy required for its administration, Congress will be under pressure to grant ever increasing sums. The $6 billion calculated for fallout shelters for everyone will be only a small fraction of the total cost. It

has been calculated that providing blast protection for half the population could cost almost as much as the present national debt.

We, too, are concerned about saving lives, but in an age of 50-megaton bombs this requires the elimination of war itself.

DANGER OF GROWING REGIMENTATION OF THE COUNTRY

Beyond the implications of this gross diversion of national resources to a single nonproductive goal there are other serious dangers to an accelerated shelter program. Even a shelter which might afford the maximum protection would be meaningful only if the population were trained to use it. How can the whole population of the country be trained and organized to use shelters automatically at the first warning without the Government and the military interfering with their daily lives on a scale never suggested before?

INCREASES DANGER OF WAR

Furthermore, rather than decreasing the danger of nuclear war, an expanding shelter program would be likely to increase it. If it became obvious to a potential enemy that we were embarked on a serious shelter program, he would naturally become concerned about our intentions. At the least it would start a new form of arms race. At the worst, it would greatly increase the danger of a preemptive strike because of fear of our own preemption.

Still another consequence of a shelter race would be an increase in the destructiveness of war, if it did come. If each side is fully equipped with shelters the size of the attack needed to produce a given amount of destruction will be increased. This increases the danger to the innocent bystanders who form the majority of the world's population, without bringing security to anyone.

FALSE SENSE OF SECURITY CREATED

The inadequacies of the proposed program are obvious—it provides for only a small fraction of the populace; shelter space would be concentrated in downtown areas of highly built-up regions, not related to the distribution of people; and it makes little provision for the most important effects; blast and fire. But the activity of the Federal Government in widespread labeling and stocking of shelters and the attendant appearance of action may mislead people into a sense of being protected, even though the chances of any individual's surviving an actual war will be little affected. To the extent that people are thus deceived into believing they, as individuals, can survive a war, the danger of accepting nuclear war as a means of resolving our problems increases.

Finally, the excessive concern with shelters, indicated by the proposals to spend ever-increasing sums, represents a pessimistic assessment of the chances for avoiding war. The $760 million requested for the total civil defense program is about 120 times the appropriation requested for the Arms Control and Disarmament Agency, for example. If the appropriation is approved by the Congress it will be widely and reasonably interpreted as an indication that the Government of this country has greatly increased its estimate of the chances of nuclear war—really a confession of failure in its "peace race."

DEVOTE EFFORTS TO PEACE NOT WAR

In closing, I should like to emphasize that there are many, many better ways to use the funds we have to spend than for fallout shelters, ways which show genuine concern for people as human beings. Instead of the negative and fearful attitude which the shelter program reflects, let us adopt a positive attitude and make realistic steps toward peace.

Even the first year's anticipated expense for shelter construction would be sufficient to build 10 to 20 schools in every State of the Union. It would be far in excess of the amount needed to retrain and relocate displaced workers in such depressed areas as West Virginia. Abroad it could provide homes for 1 million families now shelterless. It could provide food for a million hungry mouths a year. It could be saving lives instead of being spent in a futile search for safety from disaster.

Why should we not use the dollars requested for civil defense to expand the Peace Corps tenfold instead of doubling it? Or put the money to work directly through bilateral programs or through the U.N., to help undeveloped areas help themselves? Why shouldn't we put some substance into the Arms Control and

Disarmament Agency—give it size and importance comparable to the research expenditures of the Armed Forces? Let us use our creative intelligence to make peace, not war, the probable future for our country and the world.

The only real defense against nuclear attack is to abolish war itself, and it is to this end that we should be mobilizing our best minds and research facilities, and spending our money.

Civil Defense

Statement of the Friends Committee on National Legislation, approved at the annual meeting, Washington, D.C., January 20, 1962

Members of the Religious Society of Friends (Quakers] have a long tradition of helping to relieve human suffering, whether it has resulted from natural or man-made disaster, and we are ready and willing to devote our services and property to such relief.

As members of the Friends Committee on National Legislation, sharing in this tradition, we cannot support the current and projected civil defense program.

The only real defense against nuclear attack is to abolish war itself.

We are convinced of the overriding need to achieve lasting peace; we are also concerned for the protection of individual life. The current emphasis on civil defense presents an issue embodying many of these deep concerns. We are in sympathy with the individual who, because he is fearful of nuclear war, wishes to build a shelter, and we recognize the natural desire to protect one's family, neighbors, and self. We recognize, too, that there are honest differences of opinion among Friends and others on the complex moral, psychological, and political aspects of the national shelter program.

A large civil defense program poses serious questions:

Would such a program tend to bring on the catastrophe we hope to avert?

Would it weaken rather than preserve our free society with its regard for the worth of the individual?

How effectively would extensive shelter facilities protect citizens in the event of a nuclear attack?

In our view, civil defense, with its emphasis on public and private shelters, drills, public education, and propaganda, tends to increase the possibility of war. In some people it encourages a false sense of security. In others, it increases fear and distrust of an enemy by bringing war preparations into the community and implying an imminent attack. It makes possible ever increasing military demands and controls. A massive public shelter program will probably initiate a new, dangerous, and costly phase in the arms race.

Seeking self-protection at the expense of others in our own neighborhood or in neighboring lands violates the basic teachings in our Judeo-Christian heritage. The vast shelter program which has been urged for U.S. citizens and industries will not aid the many millions of people in other lands who will also be exposed to large amounts of fallout if war comes, but who cannot afford to seek even the speculative safety such a shelter program contemplates, because of their limited resources.

Some have urged the use of firearms to keep friends and neighbors out of a family shelter. This is one example of the corrosive effects of fear and war preparation which eat out the fabric of a civilized society. In many cases public shelters raise the same issue posed by private shelters: who will decide which persons should be denied entrance?

Existing estimates indicate that a properly constructed shelter would afford some protection against fallout. However, proponents of the fallout shelter program often support their case by using unreasonably small estimates of the destruction which could be caused by a nuclear war. Often the figures are based on questionable assumptions. Moreover, the vast number of casualties in metropolitan areas resulting from blast and heat are often ignored or slurred over. Seldom mentioned are the immense difficulties of attempting to rebuild the Nation's shattered political, economic, and social structure, and the possible use of chemical and bacteriological weapons against those left alive.

Offensive weapons may be constructed to circumvent whatever defenses are devised. As shelters go deeper, the size of nuclear weapons can be increased or the type of attack extended.

The civil defense program impedes constructive efforts to build the conditions of peace. It siphons off the efforts of many concerned and dedicated persons, and millions and potentially billions of dollars of resources, which could better be

devoted to constructive contributions to peace—such as working to achieve world disarmament, to relax international tensions, to show friendliness toward those who distrust us, and through international cooperation, to improve the welfare of those in need.

Our Government is in a position of great leadership in the world today. It can influence greatly the course of history and play what may be a decisive role in determining whether we shall move toward a nuclear war of annihilation or toward a disarmed world under law. With faith in God and in our fellow men, we in the United States should use our time, energies, and resources to build the conditions of lasting peace.

The Only Shelter Is Peace

A statement on civil defense issued by the board of directors of the American Friends Service Committee, 160 North 15th Street, Philadelphia, Pa., December 1961

Civil defense has become a major issue in American life. The mounting interest in fallout shelters dramatizes the anxiety we all feel when confronted with the seeming hopelessness of the cold war. The prospects for continued peace seem at times so dismal that many of us welcome the opportunity to do something "positive"—at least we can try to protect our loved ones. We search for security—for a hiding place from the terrors of nuclear war. And fallout shelters will, under certain conditions, prolong or save some lives in such a war.

Despite this, the American Friends Service Committee is opposed to today's civil defense activity. We are opposed to it precisely because we are concerned with life and with the values that give meaning to life; we believe that civil defense increases the peril to both in these dangerous days.

We cannot take part in these preparations because we believe:

1. Civil defense helps to make the idea of nuclear war tolerable to the American people

Our leaders have long assured us that nuclear war is "unthinkable." Today there is a new mood creeping into public life. The unthinkable is being thought about. Our country must be ready to use its terror weapons if deterrence is to have meaning to the enemy. This reasoning requires a shelter program, and all of us—men, women, and children—are made participants in cold war strategy. What has been until now impersonal and remote is suddenly personal and close: the American family is becoming an integral part of the attitudes, the instruments, and the morals of total destruction. Without really knowing why, we are coming to accept the unthinkable as tolerable. This is what now compels the American Friends Service Committee to stand and speak. Nuclear war is not tolerable. The physical agonies of slow death and disease, disorder and dictatorship that would greet survivors are well documented. Even more terrible—though less considered—is the moral death that would be suffered by those left alive. To have been party to destroying God's good earth, and His children, and the beauty of man's creation, would be to forfeit any claim to moral purpose.

2. Civil defense makes a nuclear war more likely

Men think they must build shelters to be secure and then, feeling less vulnerable, they tend to become more belligerent. And if Soviet citizens are going through the same process, they, too, will increase the harshness of their position, and the futility of "deterrence" becomes evident. For toughness between armed titans produces not concessions but answering toughness, and the world is only pushed closer to the brink. As the process makes war more likely, a sense of inevitability is born and a dangerous situation is imperceptibly transformed into a hopeless one. Our compelling need is to reverse this trend. Civil defense only gives it further impetus.

Even if we take this risk of making nuclear war more likely, will our shelters really provide security, or only its illusion? If nuclear war comes, can there be serious doubt that for most of us our underground shelter will be our tomb?

3. Civil defense threatens us with inward moral collapse in the name of strengthening us against outward danger

When Americans seriously debate shooting each other to insure the privacy of their shelters, when suburbia thinks to save itself with no thought of the crowded city, when theologians seek an ethic that releases us from the dilemma of our neighbors' needs—we are not engaged in defending our values; we are involved, personally and intimately, in their destruction. When these things happen, our democratic society begins to die.

Nor would a huge Federal program of shelters for all offer any hopeful result. Besides further reinforcing the delusion of war's tolerability and further increasing its likelihood, a program of Government shelter construction brings with it other new and profound moral problems. To squander our substance on underground caverns buys no gains for peace; it offers no enlightened leadership; it charts no constructive course for the future. The drive to build shelters for all would stifle the effort to provide for the real needs of our country and the world, and preempt the time and energy of leaders who should be working for peace.

Men have considered how they would deal with contamination through fallout. They have not yet begun to think about the contamination of a democratic society readying itself to live underground. How much regimentation, arbitrary authority, and physical coercion will be necessary to keep the Nation in a state of readiness to use its underground shelters? Democracy and shelter living go ill together, and a nation that prepares to bury its people may well be burying its dreams.

THE ONLY SHELTER IS PEACE

And "peace is world order and political institutions. It is justice and the control over the strong. It is mercy and the restraint of the merciless. Peace is love conquering fear. It is a lively concern for all men, for friends and for rivals, for the lovely earth, for life and for joy. It is the only house in which men can now live." [1]

The world has not yet known this kind of peace. It comes neither from surrender nor from war, but from daily grappling with the hard tasks of converting the United Nations into a center of world order, of lifting the burden of arms from men's backs, of using the earth's resources for the common good, of assuring freedom with justice for all. We must dare now to live as moral men, at long last relying on our ability to change men's hearts rather than on our capacity to destroy their lives.

Our Christian faith impels us to care about lives—our own, our children's, our neighbors', our enemies'. Life is not to be equated with survival, but with living as God means men to live, serving one another. Let us be about His business.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESSES

REV. JOHN H. EBERLY, DIRECTOR OF THE BRETHREN SERVICE CENTER, NEW WINDSOR, MD.

MISS RUTH E. EARLY, WASHINGTON, D.C., REPRESENTATIVE OF CHURCH OF THE BRETHREN

GERALD F. BECKER, VOLUNTEER IN TRAINING, CHURCH OF THE BRETHREN

JON A. CARLSTROM, VOLUNTEER IN TRAINING, CHURCH OF THE BRETHREN

Mr. THOMAS. We have with us this morning Rev. John H. Eberly, General Brotherhood Board, Church of the Brethren, who wants to talk about civil defense.

Doctor, we are delighted and honored to have you and your staff. If you don't mind we would like to have you introduce the staff to us and tell us something about yourself.

Reverend EBERLY. Could I pass out a statement from our General brotherhood board from which my paper has quoted?

Mr. THOMAS. We will be delighted to have it, sir.

(The document follows:)

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[1] From the Friends Conference on World Order, October 1961.

Statement on the International Situation

(The following statement was adopted by the General Brotherhood Board at its meeting in November; it is commended to the members and congregations of the Church of the Brethren for their study and action.)

In a time of steadily mounting world crisis the General Brotherhood Board has given prayerful consideration to several immediate vital concerns. We present our convictions to the members of our brotherhood for study and action.

1. We favor increased support of the United Nations as both a symbol and a method of achieving and maintaining peace in the world community.
2. We favor universal membership in the United Nations to provide a forum for the discussion of the issues which divide mankind.
3. We oppose the testing of nuclear weapons by any nation at any time at any place.
4. We express serious reservations concerning the civil defense program and advise our members not to build family fallout shelters.

OUR SENSE OF INVOLVEMENT AND URGENCY

A succession of interlocking events converge to make this hour potentially one of the most explosive in human history. Berlin and Vietnam, the Congo and Cuba, multiple megaton bombs and nuclear testing, civil defense and fallout shelters, the intransigence of the great powers, the rise of the new nations, and the plight of the United Nations vividly picture a world filled with fear, suspicion, hatred, and death. Moreover, a new fact of our time is that crisis anywhere immediately involves the rest of mankind. The whole world is one community.

We are inevitably related to these crucial events, whether we will it so or not. To sit idly by today is to support continued chaos and eventual total disaster. As Christians we are concerned about our world, both in terms of elemental human values for everyone and in terms of what God wants us to do in the world. As brethren we desire to do something creative, even heroic, to help "bring in the day of brotherhood and end the night of wrong."

INCREASED SUPPORT OF THE UNITED NATIONS

We believe the United Nations has a crucial role in the maintenance of peace in our world. We concur in the judgment of many critical observers who hold that major international disputes and on a few occasions even war has been prevented by the efforts of the United Nations. We are convinced that the United Nations needs to be strengthened and improved in order that it can become a more adequate instrument for the development, enforcement and adjudication of international law. We believe that the United Nations continues to be mankind's best political instrument for achieving international order and peace.

UNIVERSAL MEMBERSHIP IN THE UNITED NATIONS

In order for the United Nations to be more effective, membership should eventually become universal. The admission of any nation into the United Nations does not imply moral approval of its policies, past, present, or future, but it does imply the ability of member nations to accept the full responsibility of membership. Such admission also facilitates regular contact, negotiation, and responsible action whereby that nation can more easily join the other nations of the world in working out practical arrangements and agreements for living together in one world. No international disarmament or arms control and inspection system under United Nations supervision can be effective unless every nation possessing the power to produce or to deliver nuclear weapons is a party to such an agreement and a member of the United Nations.

OPPOSITION TO TESTING OF NUCLEAR WEAPONS

The Christian conscience cries out against the purpose and injurious effects of the testing of nuclear weapons by any nation at any time at any place. The major powers in the cold war already have enough nuclear weapons to annihilate most of mankind in an all-out nuclear war. We believe our Nation should give active leadership in bringing about an internationally enforcible agreement to ban all further nuclear weapons testing and to set an example herself by immediately discontinuing all such testing.

RESERVATIONS CONCERNING CIVIL DEFENSE AND FALLOUT SHELTERS

It is our judgment that there is no effective civil or military defense against all-out war today. The best defense is peace. The admitted power to "overkill" resides in atomic and hydrogen bombs, is reflected in bacteriological and chemical weaponry, and is projected in radiological and neutron devices. These developments together with their delivery systems are such that mankind can find security neither in war nor in civilian defense.

Present testimony from competent scientists differs widely as to how many American citizens could survive an all-out thermonuclear war with atomic and hydrogen bombs. Some say that with deep and skillfully constructed shelters as much as 90 percent of the U.S. population could survive. Others say that not more than a handful, if any, could survive. It is commonly agreed that persons who could survive an attack would emerge to a doubtful survival on an earth's surface largely destroyed, desolated, and radioactively contaminated.

The nuclear arms race presupposes ever larger thermonuclear weapons and thus an even smaller number of survivors from war's holocaust. It is our judgment that the fallout shelters program is but another aspect of war's impingement upon our total life. For these reasons—

(1) We cannot accept the validity of the "defense" aspect of our civil defense system.

(2) We doubt that there is major protective value in any nationwide program of building community fallout shelters.

(3) We advise our members not to build family fallout shelters.

Civil defense is rapidly becoming an integral part of our American way of life. It may soon involve every community, every institution, and every family in the Nation. It is both an ideology and a concrete program. It is both the result of fear and the cause of fear. It is the carrier of both negative and positive human values. It is staggering in the immensity of its scope and cost.

Civil defense, therefore, presents the church with a major challenge for objective study, prayerful consideration, and bold action. On the one hand, the church must witness boldly and persistently against every aspect of civil defense which in design or practice fosters fear, encourages hate, or increases war potential. On the other hand, the church must be ready to render creative service to all who suffer in disaster. The church, both nationally and locally, should establish policy and practices which reflect in integrity the church's concern in the area of civil defense.

OUR CHRISTIAN RESPONSE

These times of crisis are also days of opportunity for God's church and his people. We believe it is our witness to dedicate our efforts to prevent war rather than to the more negative task of trying to protect ourselves against the eventualities of war. Let us redouble our individual, congregational, and brotherhood efforts in support of disarmament, the United Nations, assistance to underdeveloped areas of the world, disaster service, justice, and freedom.

We reaffirm our faith in God's sovereignty. His word will be the last word; His way will triumph. This providential rule does not lead to resignation on man's part but calls for participation in His mighty acts. We are to be joint heirs with him who came "not to condemn the world, but that the world might be saved through him" (John 3: 17). What we do in history has eternal significance beyond history. We face the future in faith, not in fear; in dedication, not in despair; in service to others, not in protection for ourselves. For whether we live or die, we belong to Christ.

Reverend EBERLY. The people with me, Miss Ruth Early who is serving as a part-time representative for our church in Washington and Dr. Gerald Becker, one of our volunteers who comes from Pennsylvania, and Mr. John Carlstrom from Elgin. Both the latter are what we call volunteers in training in our church.

Mr. THOMAS. We are delighted to have you, Doctor, Miss Early, Mr. Becker, and Mr. Carlstrom.

If you have a statement for us we will be delighted for you to insert it in the record, ad lib from it or read it as you see fit.

Reverend EBERLY. Mr. Chairman and members of the committee, my name is John H. Eberly. I am testifying here on behalf of the

General Brotherhood Board, Church of the Brethren, by the authorization of its appropriate officers. I am currently director of the Brethren Service Center at New Windsor, Md. Our testimony is in opposition to the appropriations for civil defense which are being studied by your committee. We are opposed to the total civil defense buildup and especially to the increases which are being considered at this time.

Our opposition is based first on what it does to the American public. The buildup of the civil defense program in local communities increases fear, suspicion, hatred, and unrest. Under such an emotional climate, sane judgment is more and more difficult. The foundations of the home, the school, and the Nation are weakened. No person or society can fulfill their highest possibilities under such conditions. The strength of the Nation is dissipated. Democracy itself may be lost in such a climate.

We are opposed to the civil defense buildup because of its effect upon other nations of the world. In many parts of the world our motives, intentions, and purposes are being seriously questioned. We seem not to be able to understand why many of the world's people feel about us as they do. Our civil defense buildup will become known all around the world and will further dissipate more of the goodwill we now have and which we so sorely need. The peoples of the world are more impressed by what we do than by what we say. We speak of peace and concern for their welfare but, in many instances, we act in a very contradictory way. The civil defense buildup is one of these contradictions, we believe.

We are opposed to the increase of civil defense in the third place because of what it may do to our own Government. As peoples submit to the impingements of war upon their total life, they are more susceptible to being used as pawns by the Government. This is a great temptation which some Government officials cannot overcome. Docile and complacent people frequently cause their governments to move in directions which are detrimental both to themselves and their people.

While there are differences of opinion on the effectiveness of civil defense programs, after considerable study the General Brotherhood Board of the Church of the Brethern in its meeting in November 1961 passed a pronouncement including the following statement:

> It is our judgment that there is no effective civil or military defense against all-out war today. The best defense is peace.

Increased appropriations to the civil defense program would, in our judgment, be a waste of the country's resources and of our tax money.

Many causes for human betterment need additional funds. The money which is being considered for civil defense could much more appropriately be provided to guarantee a more adequate Arms Control and Disarmament Agency. It is our understanding that this Agency received only slightly more than one-half of the amount requested last fall and which was needed to do its work properly. This is only one example of the many that could be listed for which funds could be used to a greater advantage.

There is considerable discussion in civil defense circles in local communities regarding structure changes in our churches to make them appropriate fallout shelters. Churches have always been avail-

able to meet the needs of people in the community and especially in times of disaster and tragedy. We are sure that they will always be available to meet human needs in such an hour regardless of when or where the need may arise. On the other hand, we feel it is entirely out of place to turn churches into fallout shelters and we would not be favorable to having this included in any civil defense program. Churches are places for prayer for all peoples.

God is the sovereign ruler over all of life, including political life. All governments should recognize their responsibility to God, their citizens, and the world community (General Brotherhood Board, Church of the Brethren, March 1962).

It is true of nations as well as of individuals that—

whosoever will save his life will lose it but whosoever will lose his life for my sake the same shall save it (Luke 9: 24).

Mr. Chairman, we thank you very much for the opportunity of appearing.

Mr. THOMAS. You have made a fine statement, Doctor, and we greatly appreciate your taking time out to come and talk with us. You have given us a very fine succinct statement here. It takes time to prepare such a statement and we are very grateful to you. It is very helpful to the committee. Come back and see us again and bring your staff with you, of course.

Thank you very much. We have been very delighted to have all of you.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESS

DR. DONALD N. MICHAEL, PEACE RESEARCH INSTITUTE

Mr. THOMAS. Gentlemen, we have with us Dr. Donald N. Michael. He is director of plans and programs, Peace Research Institute. I believe he has a statement for us here concerning civil defense.

Doctor, we are delighted and honored to have you with us. If you have a statement we will be glad to put it in the record or if you want to ad lib from it you may. Before you start with your statement would you tell us something about yourself?

Dr. MICHAEL. I am a social psychologist with a background in the physical sciences. I have worked for years on problems of national security.

Mr. THOMAS. Not too many years. You are young. How old are you?

Dr. MICHAEL. I am 39. Inside and outside the Government I have worked on these problems for 10 years.

Mr. THOMAS. Where did you get your doctorate?

Dr. MICHAEL. At Harvard, in social psychology in 1952.

Mr. THOMAS. That is wonderful. Congratulations. You have been quite a busy man for 39.

Mr. OSTERTAG. What is the Peace Research Institute?

Dr. MICHAEL. The Peace Research Institute is a nonprofit organization whose president is James Wadsworth. Its task is to stimulate research on problems in connection with attaining and maintaining a peaceful world. We don't take sides. Our job is to see that the work

is done. There is a lot to be studied. It cannot all be done in Government. There are a lot of people in the research community who would like to work in these areas, who have professional competences to provide, who don't know what the problems are and our job is to try to inform them about the problems.

Mr. THOMAS. We know Mr. Wadsworth quite well. He is a distinguished American.

We are delighted to have you and would like for you to give our best to Mr. Wadsworth.

Mr. OSTERTAG. Mr. Wadsworth is not only an old friend but we are associates. As a matter of fact we started our political careers together the same day in the New York State Legislature. He represented the adjoining county of Livingston to my county of Wyoming.

Mr. THOMAS. He and our colleague have rendered outstanding service not only to their great section of New York but to the Nation and we are proud of both of them.

Mr. OSTERTAG. Doctor, how is the institute financed?

Dr. MICHAEL. Our funds come from public and private sources. We have a small housekeeping grant from the Institute for International Order in New York. One of our projects which I will be referring to was partially supported by the Committee on Psychology in National and International Affairs of the American Psychological Association, with some small help from the National Institutes of Mental Health. We have a variety of grants of this sort and contracts, both public and private.

Let me emphasize that we have no preconceptions about the best way to get from where we are to where we would like to be. Our job is to see that systematic and careful study is done.

Mr. THOMAS. Proceed with your statement. We are anxious to see what you are going to say.

Dr. MICHAEL. All right, thank you.

Gentlemen, I appreciate this opportunity to speak to you as a private citizen who feels that too little is understood about the implications of a fallout shelter system to decide whether it is or is not in the national interest to invest resources and hopes in it. Let me describe only three of the many challenges facing a shelter program which, on the basis of public information, are not now being adequately met or sufficiently studied.

These are (1) the ethical problems associated with access to community shelters, (2) the limits of understanding of the capacity of complex societies to recuperate from heavy nuclear attack, and (3) the degree of Federal control needed to supervise local approaches to the implementation and command of local shelter programs. Time will permit only the slightest sketch of these problems. Indeed, for the most part, the most that can be done now is to ask careful questions in the light of present knowledge of what we are relatively ignorant about. Detailed exploration of the approaches to these problems has yet to be made, much less possible answers provided.

Let me now turn to the ethical problem of community shelters. Because of the deep and divisive moral problems over who was entitled to share a private shelter and under what circumstances, there was considerable relief when the proposed private shelter program was shifted to a community-oriented one. However, until there are so many community shelters that most people believe that

wherever one is, day or night, one will be acceptable in the nearest shelter, this same moral problem will exist. For example, how are shelters in schools to be designed and operated so that otherwise unsheltered adults crowding in with the children will not pack them to the point of failure? When away from one's home area, how is it to be determined who can enter a shelter in the area one is visiting? What about those communities which don't build shelters but are adjacent to those which do? Political boundaries will be unrecognized in time of crisis. In addition to space, those shelters will be more attractive which are better stocked with such things as food for infants and which can preserve the personal medicines so many need for everyday survival. These inequalities cannot be hidden from the public. Either so many shelters must be built and well stocked at once as to give the illusion of equal protection for all or there must be public statements by those responsible about how they will keep out the unacceptables—with the moral, political, and ethical problems that involves—or much of the public will, as recent systematic studies show, continue to think of shelters as inadequate to the point of disbelieving in them.

On the second problem, I would like to indicate that my concern is based on 10 years of study as a consultant to the Committee on Disaster Studies of the National Research Council, the staff of the Gaither committee, and consultant to the old OCDM. Our knowledge about social behavior in disaster—which is considerable when applied to civilian disasters or conventional warfare—may well be in many crucial matters inadequate for predicting with any conviction the capabilities of complex societies to recover from heavy nuclear attack, in a recognizable form with the values which they went to war to protect and preserve. Until we face up to what we don't know about human behavior in this sort of situation, we will be unrealistic in the assurity with which we assert either the likelihood or impossibility of the recuperability of people and societies. It may well be, for example, that a really effective fallout shelter program, which can preserve the core of the kind of society we want, requires a much more elaborate, intensive, and controlled allocation of human and material resources during peacetime than now contemplated in the present proposed shelter program.

Consider now my third question, the required degree of Federal control to produce and operate a national program that protects the national interest. For example, if as is presently the case, civil defense cadre and general public training standards are left to the States to establish, it is highly likely that gross differences will exist in shelter taking and survival capabilities with the result that if and when the postattack remnants attempt to reorganize, some areas will be critically jeopardized by the inept preparations in others. Another example: the absence of consistent, detailed, across-the-board direction which, in this case, only the Federal Government can provide, encourages local, misguided extremism. The present plan exposes those who want more or less shelter to the potentiality of excessive pressure for conformity and provides attractive opportunities for demagoguery and extremism which, in some localities, have already been divisive rather than cohesive community forces.

Only careful, unbiased study and research can answer the questions posed by the above and related problems. To jump into a program

out of panic, or expedience, or the natural human desire to "do something" could in the long run—perhaps even the short run—weaken rather than strengthen our capabilities as a democracy to ride out the threatening years ahead.

I would like to submit for insertion in the record a more detailed statement of these questions and others which derive from a conference which the Peace Research Institute held.

Mr. THOMAS. We will be delighted to have them. However, the report has already been printed and will be filed with the committee.

Mr. OSTERTAG. What can we deduct from your statement and your position?

Is it that you are proposing, or recommending, nothing be done at this time, we are not ready, or are you opposed to any move toward a fallout shelter program?

Dr. MICHAEL. It is very hard to give a categorical answer to that.

Mr. OSTERTAG. It is hard for me to arrive at a conclusion. Are you outwardly opposed to it, or calling for a delay?

Dr. MICHAEL. What I am doing essentially is calling for a delay in establishing any program which, once started, would be very difficult to modify effectively in the light of what would be learned subsequently. The alternative I would suggest is that we do what we really have not done until now and are not really doing sufficiently now—use much of the money proposed for shelters to do the kind of studies which may take a year of so to do, or perhaps more, that will indicate what one can really expect from a shelter program and how it should be designed to produce what one would hope for from it.

Mr. OSTERTAG. We have already expended hundreds of millions of dollars in surveys and studies.

Dr. MICHAEL. Yes.

Mr. OSTERTAG. I am wondering if there is any end to the determination that might lead to a positive position.

Dr. MICHAEL. I am quite aware of the effort, having spent some of that money myself, or having it spent on me over the years, I know.

I would say some of the glaring problems just have not been explored. For example, there is an eagerness, as you know, in many communities to build school shelters, but nowhere is there adequate appreciation of the fact that a school shelter may be a tomb rather than a place to preserve children. Nothing is done about devising adequate ways to protect those children in the shelter from the people who have no shelter who want to crowd into it. They are not being stockpiled appropriately for that. Barricade doors are not being contemplated. Nor is adequate ventilation being provided for a jampacked school shelter.

I am trying to indicate, the studies that need to be done about how you cope with these socially, politically, ethically serious problems in connection with the development of a program, have not been done. There is just too much easy talk, too much eagerness to move in on a program because it allows you to do something. And it allows people who have been in favor of shelters, the local civil defense directors for example who have been unable to do much for 10 years, to be busy. We do not know enough. We have not done the studies of the sort we need to do.

Mr. OSTERTAG. You are aware, of course, this subcommittee of the Appropriations Committee only deals with the funding?

Dr. MICHAEL. Yes.

Mr. OSTERTAG. To this moment there is no outright clear authorization. There is legislation pending before, I believe, the Armed Services Committee. Have you testified before that committee?

Dr. MICHAEL. No.

Mr. OSTERTAG. Do you plan to?

Dr. MICHAEL. If I have the opportunity to. I am looking into it.

Mr. OSTERTAG. That is the first move, of course.

Dr. MICHAEL. May I add one important comment to your question.

I do think fundamentally that the present program is inadequately conceived, and, therefore, is undesirable. The consequences for the general state of mind, the national posture, and the strength of the Nation are more adverse than good if we proceed as we are now doing because the present program will inevitably produce divisiveness and frustration.

Mr. OSTERTAG. You are not opposed to the idea of transferring the responsibility to the Defense Department, are you?

Dr. MICHAEL. That is a complex issue, as you very well know. I would prefer to see this as a civilian effort.

But I do not really see how you are going to get the cooperation of the Defense Department and sufficient coordination unless it is in the Defense Department. I think there are many merits in having it a civilian effort. We have had 10 or more years of civilian control. And I think that a major reason Civil Defense has not succeeded is because it did not look important because civilians were doing it. If it is in Defense, it is important, by definition.

Mr. RHODES. I note two of the conferees who took part in the Shelter-Centered Society are Professor Riesman and Dr. Raskin, two of the authors of the liberal papers.

Dr. MICHAEL. Yes.

Mr. RHODES. Does your organization subscribe to some of the ideas set forth in the "Liberal Papers" about recognition of Red China? Are you a pacifistic organization?

Dr. MICHAEL. I want to make perfectly clear, our task is not to sponsor any position. Our task is to encourage study to see what possibilities various positions have for improving our posture. Professor Riesman was involved because he has been very much aware of, interested in, and knowledgeable about certain aspects of civil defense, and he had spent time in Japan where he studied their reactions to our shelter proposals. We wanted his expert knowledge as a social scientist. I think after you have read the report you will be impressed with the objective approach of the group.

This was not an effort to make a case for one side or the other. It was an effort to pose, as social scientists, crucial problems we thought needed more study in order to understand the full implications of a shelter program.

Mr. RHODES. Do you take into consideration the possibility there may not be a lot of time left?

Dr. MICHAEL. Yes, in some ways this has been taken into consideration.

However, if there is not a lot of time left we will not have a very useful shelter program either in that time.

Mr. RHODES. You mean it is already too late?

Dr. MICHAEL. If you are going to have a good shelter program, it is going to take time to get it. If we do not have that time, there is not much point in making the present kind of effort.

Mr. RHODES. You do not think any effort at all should be undertaken unless it can be a perfect effort?

Dr. MICHAEL. I don't expect human efforts to be perfect but I do see glaring inadequacies in our present understanding of what we are attempting to do which could be alleviated by further candid, detailed, systematic study of the sort we put into our analysis of weapon system implications. We do not just run off and build a weapon system because we like the looks of the rocket, or because we want to do something.

I think the same kind of careful study ought to go into a civil defense system: what is required to operate it, maintain it, and develop democratically based support in the public for it, to keep it from being subject to too many pressures from vested interests and expedient actions. We have not done these studies.

Mr. RHODES. What is your annual budget? How much does it cost your organization to operate each year?

Dr. MICHAEL. We are too young to have an annual budget yet. We would hope to have a budget around $150,000 to $200,000 a year.

Mr. RHODES. How much did you spend last year?

Dr. MICHAEL. We will have spent something on the order of $80,000.

Mr. OSTERTAG. Are you familiar with my bill to change the Security Council to that of Security and Peace Council?

Dr. MICHAEL. I am indeed.

Mr. OSTERTAG. Is your organization in accord with the general approach?

Dr. MICHAEL. It would not be appropriate for me to imply that I am speaking here for the Peace Research Institute.

However, I think we would all agree that the purposes you intend to realize by proposing a National Security and Peace Council are highly pertinent, and yours is a most desirable approach. There are crucial aspects to both national security and world peace which require a perspective of the sort implied in your bill.

I would say certainly this is a way to enlarge our ability to cope with these complex problems, and enlarge our perspective toward them.

Mr. THOMAS. Thank you very much, Doctor. You have certainly been most helpful. We are honored to have you.

Dr. MICHAEL. It has been a great privilege to be here.

Mr. THOMAS. We appreciate your expressions. Thank you very much.

THURSDAY, APRIL 19, 1962.

ARMS CONTROL, DISARMAMENT, AND CIVIL DEFENSE

WITNESS

DR. SANFORD GOTTLIEB, POLITICAL ACTION DIRECTOR, NATIONAL COMMITTEE FOR A SANE NUCLEAR POLICY

Mr. BOLAND. We have with us Dr. Sanford Gottlieb, political action director, National Committee for a Sane Nuclear Policy.

Dr. Gottlieb, we welcome your appearance and we will be happy to hear from you.

Dr. GOTTLIEB. My name is Sanford Gottlieb. I am political action director of the National Committee for a Sane Nuclear Policy.

We would like to request the subcommittee to examine most critically the claims being made for the administration's proposed program of fallout shelters. It seems to us that the taxpayers' money can better be spent on programs that are far more fruitful than the construction of shelters which, in the face of the increasingly destructive power of modern weapons, may be obsolete by the time they are completed. We summarize here a few of our own criticisms.

A SHELTER PROGRAM RAISES MANY UNANSWERED QUESTIONS

A fallout shelter program is just a small part of civil defense. As limited as it is, a shelter program raises many questions which have not been answered. These questions deal with preparation for life in shelters and the chances of survival after a war.

A citizen cannot just stroll into a shelter for a stay of 2 weeks or more without a good deal of preparation. People must be trained to remain in cramped quarters, with perhaps as many as 1,000 others, at a time of great stress. Serious training should include practice exercises in which whole communities are awakened in the middle of the night and obliged to move into their shelters for a considerable length of time. Managers should be trained to operate community shelters, and the shelter users should be trained to accept the authority of the managers.

The human factor is as important as material factors such as available space, ventilation, food, and medical supplies. Here are some of the so far unanswered questions on the human factors involved in operating community shelters:

Who will be trained in the job of deciding when a shelter is full and the door must be barred? How will people be prevented from breaking out to join children or other family members who are kept outside? How will communication be maintained with the outside world? Will every shelter be equipped with a battery-powered radio which maintains contact with a network of broadcasters who, themselves separated from their families, survive the attack?

What will be done with the people who panic under the strain? What will be done with those, particularly infants, who are most susceptible to dietary and respiratory troubles, who die in the shelters?

Will we require a garrison state to prepare our citizens for such an ordeal?

These are painful questions, but they are real ones. They must be answered if civil defense is to be taken seriously in the nuclear-missile age. However, even if there are answers and even if the tremendous material problems are solved, there are still no guarantees of survival in case of war. After surviving 2 weeks in a shelter, one may emerge into a world so devastated or radioactive that it will no longer support human life. Or the enemy may launch more than a single attack, and force people to stay in shelters after their supplies give out.

The chances of survival after a war with H-bombs would depend on many factors, especially the size of attack. In a study submitted by Hugh Everett III and George E. Pugh, of the Institute for Defense Analyses, to the 1959 Holifield hearings, the total casualties from fallout after 60 days, in a 5,000-megaton attack on cities, were calculated at 59 percent of the population—for a population which has had 6 months to build shelters. In a 10,000-megaton attack in the same study, total casualties from fallout rise to 75 percent of a sheltered population. These figures are found on page 876 of the Holifield hearings.

Even an attack limited to airbases, according to this study, would cause 32 percent total casualties at 5,000 megatons and 52 percent at 10,000 megatons.

The physicist, Dr. Ralph E. Lapp, believes it would require only a 7,500-megaton attack on this country to contaminate the soil with strontium-90 and make recovery impossible—with a fallout shelter program.

The Soviet Union is estimated to possess 10,000 megatons in its nuclear stockpile, but can deliver only a part of this destructive power now. As the arms race continues, an attack of this magnitude will become feasible. By the time shelters could be built for even a sizable part of our population of 185 million, the growing destructive power of the Soviet Union could render the shelters useless.

The effects of nuclear war outlined above are limited to radiation. We have not mentioned blast and fire. These other effects decrease further the chances of survival of a sheltered population. To take one example, Dr. John N. Wolfe, of the Division of Biology and Medicine of the Atomic Energy Commission, has testified that fires from nuclear war would burn the oak and pine forests from New England to Virginia, the pine on the southern Atlantic and gulf coastal plains, and the drier forest types of the Rockies, the Pacific coast, and the Northwest. Following the fires would come flood and erosion.

In view of this likely possibility, how would the proposed civil defense program cope with the problems of food and water supply, heat, light, sanitation, natural resources, transportation, communication, and manufacturing?

VOTER OPPOSITION TO SHELTER PROGRAM

Every poll of constituents released by Members of Congress this year shows that American voters feel that fallout shelters are futile, even if they do not know all of the facts we have mentioned. In answer to questions about whether they would support a Government fallout-shelter program, the constituents of the following Congressmen replied in the negative by the percentage indicated:

E. Y. Berry, South Dakota, 76 percent; Frances P. Bolton, Ohio, 72.3 percent; Paul Findley, Illinois, 65.1 percent; Robert Kasten-

meier, Wisconsin, 72.3 percent; Catherine May, Washington, 71 percent; Thomas Pelly, Washington, 73.6 percent.[1]

Representative Edwin B. Dooley, of New York, has not finished tabulating his poll. When he had 25,000 responses, the majority against a fallout-shelter program was 72 percent. Only Representative Bob Wilson, of California, has released a poll which shows a majority favoring a civil defense (56 percent), but his poll was taken during the high emotions of last year's shelter controversy and is now 7 months old. By contrast, the nationwide Copley News Service questionnaire released in February of this year shows a majority of 66 percent who indicate they would not build a fallout shelter.

From these indications we conclude that the American people know that there is no real defense against nuclear war, even though their Government has been less than candid in giving them the facts. It is our belief that a relatively modest investment in programs which have some likelihood of moving the major power blocs toward inspected disarmament and strenghtened international institutions makes much more sense than putting money into shelters which offer, at best, the survival of some people but not of a free society.

We would like to submit for the use of the members of the subcommittee the pamphlet, "The Effects of Nuclear War," published by the National Committee for a Sane Nuclear Policy, as further documentation of our point of view.

Mr. RHODES. Could we find out what this relatively modest investment is that would insure inspected disarmament?

Dr. GOTTLIEB. Well, sir, if I may, I do not think there is any one thing that would insure it.

I spoke of some likelihood of moving the major power blocs toward it. One extremely modest investment would be the appropriation for the Arms Control and Disarmament Agency which is asking for $6.5 million for the coming year. I think certainly, by comparison with the arms budget which the Congress passed yesterday, this is extremely modest.

I might add, $100 million for U.N. bonds, by comparison, is extremely modest.

Mr. RHODES. Do you think there is a chance that the Communist powers are at this time looking toward peaceful solutions?

Dr. GOTTLIEB. Well, it is awfully difficult to tell what the Communist powers' motivation may be at any given moment. I think, as has been pointed out by officials of the Arms Control and Disarmament Agency, there are areas of common interest.

One area of common interest is in avoiding a war. A second area of common interest is in preventing the spread of nuclear weapons; and a third area of common interest lies in reducing the terrible economic burdens which apparently are more burdensome to the Soviet Union that they are to us, which result from the arms race. I think it is in this area of common interest that we must look for any possible solutions to the problem.

Mr. RHODES. I am not going to argue with you. Let the record show I disagree completely with some of the statements you have just made.

[1] Since this testimony was written 3 additional polls have been published in the Congressional Record. They show a majority of 71 percent against a Federal shelter program in the district of John R. Pillion, of New York; 69.4 percent in the district of William E. Minshall, of Ohio; and 48 percent (with 36 percent in favor) in the district of William H. Avery, of Kansas.

Your organization is also against any further nuclear testing, I believe.

Dr. GOTTLIEB. That is correct.

Mr. RHODES. Do you believe we should develop an antimissile missile?

Dr. GOTTLIEB. Well, I think it would probably be in the interest of national security if such a thing could be done. I think it is extremely dubious such a thing will be possible, as the President has told at least one reporter that I know of, off the record. But I think these things have to be weighed against the disadvantages of creating still another incentive for the Soviet Union to resume testing following our tests.

Mr. RHODES. What incentive did they have to resume testing a few months ago?

Dr. GOTTLIEB. One can only guess at this. I would imagine that one incentive they had came from a desire to develop missiles similar to our MINUTEMAN and POLARIS.

Mr. RHODES. You do not have to test atomic weapons in order to develop missile-carrying submarines, or missiles. You would test to develop a dependable nuclear warhead. Do you agree?

Dr. GOTTLIEB. Apparently you do have to proof test. This is not meant certainly to excuse their tests, which I consider a criminal act.

Mr. RHODES. Are you aware we have never tested a warhead of a missile with an atomic capability?

Dr. GOTTLIEB. We have never conducted proof tests?

Mr. RHODES. That is correct.

Dr. GOTTLIEB. There have been tests of weapons to develop——

Mr. RHODES. That is another matter. There has never been a test by this country of a missile with an atomic bomb in the warhead. Do you not think we should at least see if they work?

Dr. GOTTLIEB. I think one has to balance that kind of consideration against other considerations, and see if they, on balance, are in the interest of national security.

Mr. RHODES. What is your feeling about it?

Dr. GOTTLEIB. My feeling is that the more one side tests, the more it creates an incentive for the other side to test, and that there is no end to this race. This is the very nature of the spiraling arms race that President Kennedy talked about in his U.N. speech, during which he said, "In a spiraling arms race a nation's security may well be shrinking even as its arms increase."

Mr. RHODES. There is an end to the race all right if the Communists ever get to the point they think they can conquer the free world. Then they will end it on their own terms.

Have you read the writings of Marx and Lenin?

Dr. GOTTLIEB. Yes.

Mr. RHODES. Mao Tse-tung?

Dr. GOTTLIEB. Yes.

Mr. RHODES. Do you believe when people write something they mean what they write?

Dr. GOTTLIEB. I think the Communist powers would most certainly like to spread their system, but they do not want to commit suicide.

Mr. RHODES. Of course, if we keep doing what your organization says we should do, they probably will not have to commit suicide.

Dr. GOTTLIEB. My organization says we should follow the goals set forth by President Kennedy at the U.N. last September.

Mr. RHODES. I do not find any similarity between the goals of your organization and the apparent goals of this administration. I do not imagine President Kennedy would exactly espouse some of the statements I have read attributed to your organization about nuclear testing.

Mr. OSTERTAG. He has ordered nuclear testing; has he not?

Dr. GOTTLIEB. That is correct.

Mr. RHODES. If you are trying to hide behind President Kennedy's mantle, you had better find another place. It is obvious that he does not agree with you.

Dr. GOTTLIEB. Our organization agrees with the goals as stated by the President. We disagree with the approach that says the way to get there is to resume another round of nuclear tests and to have a civil defense program.

Mr. THOMAS. We are delighted and honored to have you come before us. We appreciate your point of view. You have presented your case very clearly and succinctly. We are going to give it some good careful study.

Dr. GOTTLIEB. Thank you, Mr. Chairman.

Mr. THOMAS. It is not very easy for you to take time out and prepare a fine statement like you have. It is burdensome to you.

Dr. GOTTLIEB. Thank you.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESS

DR. JOHN E. ULLMANN, PROFESSOR AND CHAIRMAN, DEPARTMENT OF MANAGEMENT, MARKETING, AND BUSINESS STATISTICS, HOFSTRA COLLEGE

Mr. THOMAS. It is certainly nice to see you. Did you leave New York this morning? If you did, you got up pretty early.

Dr. ULLMANN. I left on the 9 o'clock plane.

Mr. THOMAS. Gentlemen, we have Dr. Ullmann here. He is a professor and chairman of the Department of Management, Marketing, and Business Statistics, Hofstra College, Hempstead, N.Y.

What is the enrollment of Hofstra?

Dr. ULLMANN. 8,000.

Mr. THOMAS. Is this one of the old New York universities?

Dr. ULLMANN. It is a relatively recent one. It is the country's largest liberal arts college.

Mr. THOMAS. How old is it?

Dr. ULLMANN. 1937.

Mr. BOLAND. Is it State-supported?

Dr. ULLMANN. No; a private college.

Mr. THOMAS. What degrees do you give?

Dr. ULLMANN. We give a B.B.A. and an M.B.A. in our division.

Mr. THOMAS. What about your entrance requirements?

Dr. ULLMANN. They are the usual entrance requirements in New York State.

Mr. THOMAS. And it is supported entirely by private funds?

Dr. ULLMANN. As a matter of fact, almost entirely by tuition because we have very little endowment.

Mr. THOMAS. We are greatly honored to have you this morning, and we appreciate your taking time out of your busy schedule to appear here. We will be delighted to listen to you talk. Do you have a prepared statement?

Dr. ULLMANN. I would like, with your permission, to have our report here as part of the record.

Mr. THOMAS. It seems to be rather voluminous. You submit it for the committee and let us look it over. We are anxious to hear what you have to say.

Dr. ULLMANN. My name is John E. Ullmann. I am a civil and mechanical engineer, licensed in the State of New York. I have a doctorate in industrial engineering and I am professor of management, and chairman of the department of management, marketing, and business statistics at Hofstra College.

A group of colleagues at three universities decided earlier this year to explore the feasibility of a national shelter system. Our discussions quickly led us to the conclusion that the fallout shelters being proposed were not to be seriously regarded as a means for protecting the population. We noted, however, that the present shelter program was being presented in these terms and would thus serve to generate a demand for real protection.

We, therefore, made an estimate of what could be done to fulfill this objective. The result is the monograph "A National Shelter Program—Its Feasibility and Its Cost," which is before you and which, with your permission, I would like to see made part of the record.

Before reviewing a few highlights, let me give our conclusion that such a system could only be produced at the risk of ruining our society as we now know it and that even then it has such extensive imperfections that the survival of many people through attack and post-attack chaos is most unlikely.

The first paper in our monograph is by Professor Salvadori of Columbia University. He is one of the foremost experts on blast structures, and he has constructed a few of them for certain Government projects.

You will note that the provision of blast protection is essentially a a function of cost. You will note that as the overpressure goes down, so does the cost, but you also thereby reduce the effectiveness of the system.

I would like to direct your particular attention, gentlemen, to the paper by Professor Paschkis, professor of mechanical engineering, and director of the heat and mass flow analyzer laboratory at Columbia. Professor Paschkis has the only computer able to perform a certain type of heat transfer study, and one of his major results is to be noted on page 5.

You will see there that if you start at shelter temperature and you do not take in any additional heated air, the heat of the human body will soon render the shelter uninhabitable. Now these results were strikingly confirmed at the recent tests in Baltimore when the sailors

that were in the shelter soon found it too uncomfortable. All they did then was to turn up the air conditioning, and in an attack there would be no air conditioning.

The next piece is by Prof. T. B. Drew, of Columbia University. Professor Drew is the principal designer of the air and water supply system at the Hanford works of the Atomic Energy Commission. He is also a senior consultant to the Commission. Professor Drew has noted in his paper several major defects of air cleaning—defects which are still unsolved.

There is, for example, no way, no known way, of removing radioactive gases from the atmosphere. This is something which has so far not been properly realized, notably because the major gas involved is radioactive argon, which does not combine with any one.

Then comes my paper, which summarizes the cost elements. I will not go over each item. I just want to note one point here regarding the land.

The very cost of land for shelters will be a very large item. I have made certain estimates here. I would, however, like to remind you that on the island of Manhattan, where I live, the prime real estate runs on the order of $250 a square foot, and I am sure some of you gentlemen will find not quite such astronomical, but comparable, statistics for other metropolitan areas with which you are acquainted.

For the basic shelter structure, I have taken about half the maximum amount that Professor Salvadori mentions; however, this writes off an area of 45 square miles for a 20-million-ton bomb, and it may produce millions of casualties in several cities. Manhattan only has 24 square miles.

Well, now, shelter access—this is essentially an unsolved problem. Let me just say the Government, in some of its structures, expects people to blast themselves out.

I will switch to medical supplies. I have made a very conservative allowance here, and since I prepared——

Mr. THOMAS. I do not like to interrupt you, but you are putting your finger on some very important matters when you are talking about availability.

What part of the occupants of the Chrysler Building, if a bomb was to be dropped about 10:30 o'clock in the morning in the city of New York, would be able to get from the 20th floor to the ground floor, and if they had to walk a block and a half, what part would get to the shelter?

Dr. ULLMANN. I would say a very small proportion.

Let me point out, sir, that the daytime population of Manhattan is on the order of 5 million people in a 24-square-mile area.

Let us consider the question of medical supplies. I have only made an estimate of $15 per person, and this seems to me low for this reason: Take any random group of 500 Americans and confine them for 2 months, or make them live together for 2 months, even if they can go out once in a while. There is a 5 percent chance of at least one baby being born to them. There is a two-thirds chance of there being at least two babies. Combine this with the probability of there being no doctors in any group of 500 Americans, so you have a 40 percent chance of a woman having to have a baby without medical assistance. This, of course, is something not to be left to unskilled assistants, at least not in our society.

Mr. THOMAS. We do not like to interrupt you.

The problem this committee is concerned about looks at the other side of the coin. Suppose you have nothing in the world to offer, then what?

Dr. ULLMANN. I do not understand you.

Mr. THOMAS. Look at the other side of the coin.

Dr. ULLMANN. No shelter space?

Mr. THOMAS. Yes. What is the other side of the coin in case of a bomb? Will it amount to a hill of beans whether you have it or do not have it?

Dr. ULLMANN. It will not amount to a hill of beans whether you have fallout shelters or not. Shelters might save some people, but let's look at the cost. The cost would be on the order of $250 to $300 billion. The proposed shelter program would be very much part of our military posture. It is expected to be very much a part of the credibility of our deterrent, hence, it is something that would have to be put in place fairly rapidly. I have put here 2 years. Maybe it is 3 years, or 4 years. The effect would still be absolutely shattering to our economy.

Our national debt was increased by $243 billion between 1940 and 1947. In that time the value of the dollar was halved. A shelter program such as this would have to be put in place in about 2 years to have military value. Such pressure, coupled with the limitations of our industrial capacity in several areas of potential supply, would require us to submit to controls over our property, our labor, and our daily lives more thorough than ever devised by any society, least of all the United States.

It would mean the end of all other construction—schools, hospitals, houses, factories, machinery, and armaments. As it is, no restrictions due to scheduling, industrial preparation, and the like are considered. Even if the above estimate, which is based on current dollars, were to be high by as much as one-half, this would still be true. In fact, to alleviate the shortcomings cited, the cost would have to be substantially increased.

Let us turn to the postattack possibilities because I think they are part of it.

Professor Drew has also analyzed the question of water supply, and his major conclusion is that really only time and rainfall, and a very long time at that, could do any good to a contaminated watershed.

Artesian wells would be suitable, but I need not point out this is a major problem in many parts of the country. I believe in some parts of your own State they are not permitted to drill new wells and for good reason.

I would now like to discuss the question of the somatic effects of radiation. There is likely to be a good deal more radiation around than we normally expect to contend with, and a 100 to 200 roentgen dose, which is Professor Yost's estimate on page 15, would have the effect of greatly reducing our resistance to all kinds of sicknesses. As a result of this a common cold, within or without the shelter, could speedily become a fatal disease.

Epidemics would be able to spread without having to contend with the rather massive antibodies that we now have. Professor Dobzhansky has reviewed the genetics aspects of this, which are generally familiar. Obviously any genetic damage is unacceptable.

The next thing is the question of our industrial system under a nuclear attack.

Our industrial society is rightly one of our greatest prides. It is a very versatile and very elaborately interlinked organism. It requires impulse from all parts of the country and from abroad. We have here a little map which shows you where the products in the supermarket in New York City come from, things that you find on the shelf, and even if this were to be disrupted to a considerable degree, well, the question arises to what extent are we again geared to revert to a village-type society.

The question of industrial survival is in fact, I think, easily answered by the estimate that two-thirds of our industrial areas could be knocked out by 15 percent of the Russian nuclear capability.

Lastly, we discuss the dangers of the shelter psychology. The type of life which I have described to you, gentlemen, is one which would require an enormous amount of discipline and acceptance of a good deal of personal hardship which we in this country have not had to accept for several generations. It seems very clear that the population would have to be regimented, would have to be trained, would have to be disciplined to jump, run into shelter, shut the door, even if some people are still waiting outside, to learn how to sleep in shifts and to contend in short with a regimented society.

We have, of course, the insurance argument against shelter, but insurance does not make us take greater risks. Shelters do. The program is offered in that light, that with shelters and our people protected, we can then, one presumes, take greater risks in foreign policy.

May I also point out, gentlemen, that the shelter psychology has sometimes struck me as something of an admission of defeat by the military. They have now spent many billions of dollars for defense and I am really sorry that they seem to have arrived at the conclusion that we have to dig holes. It is deplorable.

If I may sum up my statement, you do not make a downpayment on an unsatisfactory product. You are today dealing with the downpayment but I have described the end product. Persuade the people that they can be protected and the end product will be demanded.

There are, of course, other things that I could suggest to do with the money but I do not believe that this is my responsibility today.

Mr. THOMAS. Doctor, you have made a very enlightening and compelling statement. We are grateful to you and your colleagues for this very fine brochure you have presented. We will study it carefully. We have expected a good statement from you. I will say the committee has been highly rewarded. Thank you very much. Come back to see us again.

Mr. RHODES. Doctor, your point, if I understand it, is this is not the answer to the problem. There is a problem but the shelters are not the answer to it. Is that about what you are trying to say?

Dr. ULLMANN. What kind of shelters, the fallout shelters?

Mr. RHODES. As I understood it you did not think any shelters were any good.

Dr. ULLMANN. Any shelters, no. There is no practical shelter program that would accomplish anything, without first wrecking the economy. It seems to me that the preservation of our way of life is worth something, too. If we are to do this kind of thing, it would

compromise all our other military activities and above all everything else in the country. I do not believe that shelters are worth that.

Mr. RHODES. Thank you.

Mr. THOMAS. Thank you, Doctor.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESS

REV. W. RODNEY SHAW, DIVISION OF PEACE AND WORLD ORDER, GENERAL BOARD OF CHRISTIAN CONCERNS OF THE METHODIST CHURCH

Mr. THOMAS. We have Dr. W. Rodney Shaw, Division of Peace and World Order, General Board of Christian and Social Concerns of the Methodist Church. Doctor, we are greatly honored to have you.

Reverand SHAW. Thank you, sir.

Mr. THOMAS. If you have a prepared statement, you may put it in the record or ad lib from it.

Reverand SHAW. I have a prepared statement. I think they have been distributed.

Mr. THOMAS. Proceed in any way you like.

Reverand SHAW. We feel humble to send somebody in and speak to you upon this matter that has so many facets and ramifications. We feel honored that you are taking the time to listen to us when we know there are so many demands on your time.

This decision you are called upon to make is, we feel, an exceedingly serious one in terms of the potential impact upon the security of our country, the economy of our country and the role of Congress in relation to the executive branch, the possibility of victory or defeat, in our struggle with communism on the achievement of world peace.

This being true we feel sure that before making this decision on this matter the committee will want to examine certain questions, among which we would suggest these: First, how valuable would the proposed shelter program be in giving protection against weapons already in existence?

The proposed program is based on the theory that any attack would leave our cities untouched because it would be directed principally or only against U.S.-missile and Strategic Air Command bases in order to eliminate our power to retaliate. This seems logical enough. But has there been any communique from Premier Khrushchev to assure us that he uses the same logic we do? Haven't his statements indicated quite the contrary, namely that he feels any nuclear war will be a total war with no holds barred? In such a war, would not cities be targets and fallout shelters be tombs?

Only an insane person or group would today begin a war that would mean the destruction of their own country as well as the one they attack. Does it really make sense then to adopt a shelter program based on the theory that an enemy insane enough to begin a war will be sane enough to conduct that war in a reasonable fashion by leaving our cities untouched?

2. What value will fallout shelters be in face of the kind of weaponry existing by the time the shelter construction program is completed?

If the arms race continues, the next few years will almost certainly bring into existence a newwork of earth satellites spaced in such a way that no major target is more than several minutes' delivery time from a nearby satellite. If the satellite missiles carry a gigaton-size explosive able to sear an area the size of six Western States, and these satellite missiles are loosed in a pattern burst across the country, who will have time to reach his shelter?

Inadequate even for today's weapons, will a national fallout shelter system have any meaning at all in the weaponry situation that will exist by the time the system is completed?

3. Will a shelter program increase or decrease the possibility of war?

President Kennedy himself stated on May 25, 1961, that a civil defense program would not deter the Russians from an attack, but that he felt such deterrance could be provided only by adequate retaliatory capacity.

On the other hand, there is growing support for the point of view stated in January of 1962 by Hanson Baldwin, New York Times military columnist, that—

> a national shelter program might increase world tensions and Soviet fears by leading Moscow to believe that the United States was actually shifting to a first-strike strategy.

If this point of view is correct, a major shelter effort might help produce a preemptive war by Russia in the belief that we intended to strike them when our shelter program was completed.

If President Kennedy is right, a shelter program would not lessen the possibility of war. If Mr. Baldwin is right, a shelter system would instead add to the chances of war, and therefore increase the danger to our people and our nation.

4. Where can a shelter program be stopped short of the ultimate cost of several hundred billion dollars?

There is a tremendous dynamism built into a shelter program. The efforts of thousands of business enterprises will be needed to build the shelter system. It will be natural that many of them will join in national effort to stimulate community action for participation in and expansion of the program.

As a matter of fact, I am told a newsletter has already been developed which tends to play to this market.

If we adopt the shelter pattern of life, the people can be expected to wake up someday to the fact that to expect protection by fallout shelters against today's weapons is to be very optimistic, and that to expect protection from them against tomorrow's weapons is to stretch one's optimism quite out of shape.

Having adapted themselves to the shelter way of life, it is inevitable that the people will then call for blast shelters. As representatives of congressional districts from various parts of the Nation, you are fully aware that the people in each district will demand "equality of protection" and that they will be vigorously encouraged in their demand by the multitude of businesses involved in shelter building. As men who must wrestle with governmental taxes and budgets, you are also aware that various estimates place the cost of a complete national blast shelter program somewhere between the size of the present national debt and the gross national product.

5. What would happen to the authority of Congress in relation to the Executive under an expanding shelter program?

Will a growing national shelter program mean a steady vesting of additional power in the executive branch as it is given the coercive authority necessary to carry out such a program and as, through steadily swelling civil defense budgets, it gains increased power to hold back or allot civil defense contracts to localities and Members of Congress on the basis of their "cooperation"?

6. Will not a shelter program tend to blind us to the real threat of communism and thereby add to the chances of Communist victory in the world struggle?

As General MacArthur stated to the Philippine Congress on July 5, 1961, both sides suffer a great illusion when each believes the other is preparing to launch a military attack. It is our belief that the major threat from communism is not military but lies in their efforts at economic, political, and psychological penetration of the uncommitted nations. By encouraging the illusion that the threat is principally military, a shelter program will make us less able to recognize the true Communist threat and to meet it through such creative programs as the Alliance for Progress.

To launch ourselves on the shelter path may mean that we wake up someday with a shelter on or under every other corner and the Communists in control of two-thirds of the world.

Finally, only a nation that has given up the idea of the "avertability" of war and accepted the idea of the "inevitability" of war will accept the great regimentation and economic burden required in an expanding shelter program. Such a mind-set could well doom hope for disarmament, for the continuance of our way of life, and hope for the survival of our Nation.

Because of this and the factors set out above, our Methodist Peace Division, in a resolution adopted at its December 10, 1960, meeting, has made clear its belief that a shelter race cannot be reconciled with the President's call for a peace race, and that a choice must be made between the two.

Thank you, gentlemen.

Mr. THOMAS. Doctor, you have overpaid the committee by making a clear-cut, frank and very understandable statement.

Reverend SHAW. You are very generous.

Mr. THOMAS. It has a lot of common horse sense in it. We thank you for coming and invite you to come see us again.

Mr. RHODES. I would like to say it is a very sensible statement. I have one question: You feel if there are shelters being built in Russia that this might possibly indicate they are preparing for a preemptive type of war?

Reverend SHAW. We would have to know what kind of shelters and how intensive the program is, since of course some are being built in this country of a certain type.

I would like to point out, sir, that I spent three and a half days in one of the OCDM civil defense schools at Battle Creek, Mich., last year. I was asked to represent our mission. I do not pull this up out of something I have read but out of personal observation and research.

Mr. RHODES. What is a gigaton bomb? I have heard of kilotons and megatons. This is a new term on me.

Reverend SHAW. I hoped someone here would not know anything more about this than I did a month ago. This is referred to in Dr. Brown's book. It is a billion tons.

Mr. THOMAS. Thank you, Doctor.

THURSDAY, APRIL 19, 1962.

CIVIL DEFENSE

WITNESS

DR. DAVID F. CAVERS, PROFESSOR OF LAW, HARVARD LAW SCHOOL

Mr. THOMAS. Our next witness is Prof. David F. Cavers, professor of law, Law School of Harvard University.

We are delighted and honored to have you. We enjoyed the letter you wrote the committee. We are expecting a good statement from you, Professor. I know the committee will be greatly overpaid by having you with us. We thank you for taking the time and trouble to come down.

If you have a statement for us you are at liberty to submit it to the committee, or ad lib if you choose. You proceed in any manner you like.

Dr. CAVERS. We might economize time if I followed the statement that I have prepared.

I might add that before coming down I looked into the antecedents of this committee and found that of the subcommittee of seven, five were lawyers and I think six have been to a law school. A law teacher feels just a little in jeopardy when he appears in a position where the questions are asked him.

(Discussion off the record.)

Dr. CAVERS. I might add I taught at Texas one summer and a year at Chicago. I was a neighbor to the alma mater of one of your committee members when I taught for 10 years at Duke.

I have come here at the request of an informal group of faculty members, mostly scientists, in universities in the Boston area, chiefly MIT and Harvard. This group grew out of the initiative of these faculty members in inserting an advertisement opposing fallout shelters in the New York Times for November 10, 1961. The 183 signers of that ad contributed the funds to buy the space. Since then at least 11 other faculty groups elsewhere have published the same ad, with or without revision. At last count a total of 2,896 faculty members had signed these ads. Although the original ad antedates the administration's proposed shelter program, its sentiments are so pertinent that I should like to submit it for inclusion in the record of your hearings.

Mr. THOMAS. It will appear in the record at this point.

(The letter follows:)

AN OPEN LETTER TO PRESIDENT KENNEDY

We are deeply disturbed by current developments in the field of civil defense. It appears to us that the prodigious energy of our people is being channeled into wrong directions for wrong reasons; and that continuation of this trend may be extremely dangerous to the Nation and to civilization itself.

THE EFFECT OF LARGE NUCLEAR WEAPONS

We are now in the era of 50- to 100-megaton bombs. According to the AEC estimate of October 1, a 100-megaton bomb exploded in the air would have an 18-mile radius of total destruction of ordinary structures and would ignite most wooden buildings in a radius of 60 miles. Within that area, a large proportion of the population would be suffocated by lack of oxygen or poisoned by carbon monoxide. Basement shelters under burning buildings would be useless, as would blast shelters without a reserve air supply.

Admittedly, it may be possible to design and construct a civil defense capability to permit national survival after a massive attack with such weapons. It would entail, at the very least, permanent, deep underground placement of enough of our economy and communication and a sufficient decentralization of public activities to enable operation of vital services immediately after attack. It also would require enough public blast shelters to permit ready access by almost everyone on a few minutes notice, even in the cities. The cost of such a program would be comparable to the entire capital investment of the country—several thousand dollars per person—and would consume a substantial fraction of our gross national product for numbers of years. There is a serious question as to whether the Soviet Union would stand idly by while we tried to make ourselves really bombproof. In addition, we believe that the prospect of living indefinitely in an underground fortress would not appeal to the Nation.

The Nation has not yet faced up to the real dangers of thermonuclear war. We believe that most of our people do not understand what the world would look like the day after an attack or what problems would be involved in recovering from a war which killed, injured, poisoned, and destroyed on such a large scale. Many of those who do understand have found the prospect too awful and have, therefore, put the idea from their minds.

THE RESULTS OF AN INADEQUATE PROGRAM

We are aware that our Government is trying to deal realistically with the problem of war or peace. Unfortunately, however, Government encouragement of shelter construction, as interpreted by the popular press, some local CD officials, and would-be shelter manufacturers, has led to a cruel deception of the people with respect to the protection which would be afforded, especially by individual fallout shelters. These shelters might be adequate in a "minor" atomic war, as could have started in 1950. Such a conservative program has little relevance to the type of large-scale attack which might be anticipated in 1962.

It is undoubtedly true that such shelters in areas remote from blast centers might temporarily keep alive a certain number of people. However, the continued survival of those, and of civilization as we know it, also requires the protection of the physical basis of society—the means of production and of distribution, Government and communication, etc. A program for doing that is very different from anything now being considered.

The principal danger of the present program is the false sense of security engendered. It is much like a quack cure for cancer. If we are lucky, the "treatment" may not kill us, but in the meantime, while the cancer is growing and becoming incurable, we fail to go to a reputable physician for sensible treatment. By buying a shelter program which does not shelter, and thereby believing that we can survive a thermonuclear war, we are increasing the probability of war. This probability increases both because we may be more willing to "go to the brink" if we think survival is possible and because we are less likely to devise and take any of the constructive steps which may ease tension and secure the peace.

ARGUMENTS IN FAVOR OF CIVIL DEFENSE

We recognize that many sincere people support the present civil defense program for what they believe are good reasons. Space is too short to discuss these at length, but we have examined them at length and believe they are wrong.

For example, it is said that civil defense is a deterrent. If it really protected us to the extent necessary for survival it might be; but at present its only deterrent value lies in the demonstration to the Soviet Union that we expect to have a war. Even on this point it might be argued that this is more likely to precipitate a preemptive attack than to deter one.

It is sometimes said that we should protect ourselves against a limited nuclear war, in which, perhaps, only a few cities on each side would be destroyed. Such

a war is highly unlikely. Regardless of the cause of the war, limitation would call for a degree of restraint and mutual agreement between the parties which, if ontainable in peacetime, could prevent war altogether.

There is also the "anything is better than nothing" argument. Of course, every government has the responsibility of trying to protect its citizens, even if only a relatively few of them are likely to survive a disaster. The danger is that the individual man for whom a shelter is made at his home or place of work is being made to feel significantly safer. For any given person this is almost certain to prove false.

THE MORAL ISSUES

We have not touched on the moral issues of the shelter program—the question of whether it is right to plan on "losing" our cities and the people in them when decisions of war and peace are made, the question of defending private shelters against intruders, the question of abandoning millions of injured outside while the rest of us hide underground, the question of shelters for the wealthy versus shelters for the poor or the apartment dweller, the question of the long-term effect of a shelter psychology on the values of a democratic society—these are important issues as well. We have dealt here primarily with the more pressing questione of the adequacy of civil defense and its effect on war and peace A moral cods does not exist in a vacuum. If we lose the structure of society we cannot hope to keep our moral values.

To sum up, we believe that although the present civil defense program, and in particular the construction of fallout shelters, might save a small fraction of the population in a nuclear war, this potential gain is more than offset by the fact that such activity prepares the people for the acceptance of thermonuclear war as an instrument of national policy. We believe that this acceptance would substantially increase the likelihood of war—a war which would be permanently fatal to our democratic society, even if not to all of us. The American people are capable of great effort and sacrifice. We believe this effort should be directed toward a positive program for peace with freedom. This is bound to be at least as difficult and time consuming as any preparation for war, and will require the highest type of leadership for success. At the present time the Nation is not ready to consider such a program, largely because of widespread lack of understanding of just how catastrophic war today would be. We call upon you, Mr. President, to make this plain and then to lead the Nation forward on a race toward peace.

CIVIL DEFENSE LETTER COMMITTEE,
Belmont, Mass.

(The original was signed by more than 175 faculty members from Boston University, Brandeis, Harvard, Massachusetts Institute of Technology, and Tufts University. The original appeared as an advertisement in the New York Times of November 10, 1961. It was subsequently republished independently by groups in Cleveland, Hartford, Minneapolis, San Francisco, Chicago, New York, Philadelphia, and Albany. In these and other places the views presented here have been endorsed by about 3,500 faculty members throughout the country.)

Dr. CAVERS. In appearing before you, I am presenting my individual views, not a statement adopted by the Boston Area Faculty Group as an organized body. However, I have no doubt that many of the members would agree with what I have to say. My own interest in civil defense dates from 1950. For over 6 years, I tried to interest the Government, business, and lawyers in planning how to preserve the economy under the impact of atomic attack. I served on committees, wrote articles, spoke at meetings, lectured at the Industrial College for the Armed Forces. I got nowhere. Gradually, as nuclear weapons grew in power, I decided that the precautions I was urging were simply not practical. I concluded that our main problem was how to keep out of war without giving up our freedoms. Judged by that standard, a mass shelter program seemed to me to be headed in the wrong direction. Accordingly, I changed my own direction.

Over the years civil defense administrations have been characterized by big promises and small achievements. Though civil defense is now in the Department of Defense—if not for budgetary purposes—

it seems to be running true to form. OCD has set a goal of roughly 235 million fallout shelter spaces by the end of fiscal 1967 at a cost of $6 or $7 billion. I predict our astronauts will get to outer space much sooner than OCD's present plan will produce that much shelter space.

The mainspring of OCD's proposal is the shelter incentive program. This calls on the Nation's schools, colleges, hospitals, insane asylums, old folks homes, and orphanages to put up a billion and a half dollars over the next 5 years at the rate of $300 million a year to subsidize the Federal Government by buying improvements in shelters of doubtful value. These will cost them an average of $3 for every $5 OCD is proposing to pay. I can't believe they will do it.

Let's look at the impact of these costs. OCD officials have pointed out that the incentive program won't cost many schools anything, except, of course, the value of the room space they'll lose, and OCD doesn't count that because their shelter bill will come to less than $25 per space, the maximum amount per space OCD is offering to pay. But OCD has declared that the cost of improving shelter space would average $40 per space. Hence, for every school that needs $25 or less, there will be another school that will have to spend a lot more than $40 per space, with every dollar above $25 having to come out of that school's budget. In other words, the poorer a school's building, the more it will have to pay for shelter. That seems to me a flagrantly inequitable way to spread the costs of national defense.

School budgets are sensitive these days. No doubt the American Association of School Administrators has already brought to your attention its resolution against putting shelter costs on school budgets.

I will have to correct that statement. I learned today they haven't brought the resolution to your attention but they said that protection against nuclear bombing was a total public responsibility and therefore the cost of it should not be placed on the school budget.

Now when financing higher education is becoming a national problem, are colleges going to feel any differently about paying their share? Over 5 years, this would probably total about $75 million. Again, the poorer an institution's building, the higher the cost of improving its shelters. Isn't it ironical for the Federal Government to try to extract $300 million a year from schools, colleges, and welfare institutions for fallout shelters when last year it appropriated $54 million for grants to States and loans to private schools to modernize science, math, and language teaching; $65 million for grants-in-aid for vocational rehabilitation; $140 million for grants or loans for hospital construction; and $25 million for the housing for the elderly fund? The total is a little less than $300 million. Maybe we should just call it quits.

This shelter incentive program is expected to yield no less than 100 million shelter spaces. That's a big number, but OCD admits that it is not enough. OCD expects 12 million wholly unsubsidized spaces to be added every year for a 5-year total of 60 million more shelter spaces. Who does OCD expect will build these? The owners of homes, farms, commercial buildings, industrial plants. Hasn't OCD read what has been happening to the shelter boom? Home shelter building permits in Dallas since the first of the year totaled five; in Philadelphia, three, according to the Wall Street Journal's first page

story for March 28, 1962. It was headlined "Shelter Shakeout—Sharp Drop in Demand for Fallout Shielding Blasts Builders' Hopes."

These 100 million subsidized and 60 million unsubsidized shelter spaces that OCD dreams of are to be in addition to the 50 million downtown shelter spaces that OCD plans to identify, mark, and stock with water, hard tack, sanitary kits, et cetera, by December of this year. Apparently OCD expects this figure to rise later on so as to bring OCD's national total to the 235 million shelter spaces I mentioned.

I speak as if OCD were to be carrying out these programs. I know, of course, that OCD plans to delegate the work and the money to the State and local civilian defense organizations. Some of these are pretty good; others are not. Can we really believe they are up to the job of laying out half a billion or so dollars every year, entering into hundreds of thousands of licensing agreements with building owners, negotiating with tens of thousands of school boards and city councils, passing on just how many dollars each individual licensee should get, and organizing large-scale training programs?

Parenthetically, they have a medical self-help training program projected to enable wives and mothers to know how to cope with the radiological injuries and to serve as physicians at a time when we have lost our physicians and the projection for that program is that they will train 50 million women in a 16-hour, 8-session training course. I checked the number of women between the ages of 19 and 65 in the country at the present time and the total was a little less than 50 million so that we expect a hundred percent attendance among our ladies of all degrees of maturity. I suspect the OCD has conceived an administrative monstrosity which, if given money enough, could perpetrate what James Reston warned 2 months ago was "likely to be an extremely costly blunder."

You may wonder why a group of Boston scientists should be so concerned about the unworkability of OCD's new program. We are concerned mainly for two reasons. We have seen how the fallout shelter boom was whipped up last summer as part of the Berlin crisis. We are fearful that, as this OCD program begins to go into a tailspin, assuming, of course, it gets off the ground, its sponsors may begin a new campaign of fear propaganda to reinvigorate it. This we think is dangerous for the peace of the world. Secondly, if the schools won't pay for the OCD program, probably Uncle Sam will be asked to foot the full bill. Such a program would make our schools the focus of civil defense planning, civil defense drilling, and civil defense psychology. We saw a sample of the latter at the Concord, Mass. town meeting last fall. Concord school shelter specifications worked up by a planning group, called for two 12-gage shotguns and 500 rounds of ammunition, and two .38 caliber revolvers with 200 rounds. Shades of Emerson, Thoreau, and the Alcotts: Concord has changed.

We believe, moreover, that if the Federal Government starts paying for the flimsy fallout shelter improvements now in prospect, the lack of protection against blast and fire will soon be recognized, especially by the many millions who live within the 60-mile fire range of 100 megaton bombs. Then we may well get pressure for really big and hard shelter programs—programs that might start at $20 billion as Representative Holifield assumes but could easily escalate to $100 or even $200 billion, the estimate made in an article "An Answer to

Teller" by eight scientists, five of them in our group, in last week's Saturday Evening Post.

That article deals primarily with problems, where it deals with shelter it deals primarily with the blast shelter problem because that is what Dr. Teller has been trying to sell. It also has a good deal of learning relevant to the general civil defense program. I wonder if you gentlemen would care to have a copy of this.

Mr. THOMAS. We would be delighted to have it if you will be kind enough to leave it with us.

Mr. CAVERS. I marked the part that is most relevant to the shelters with a red crayon so in case you think it appropriate for the record it could be inserted without taking the whole. This, incidentally, is an amazing achievement. It was spontaneously written as two articles, one by five people at Harvard and MIT and another by three people at Cornell. They sent them into the Post. The Post felt they could not publish two articles on this, since they are publishing one by Hanson Baldwin, taking much the same view, so they merged the two. This is a contribution of eight authors.

Mr. THOMAS. We are anxious to get into it. I think I read it. It is excellent.

Mr. CAVERS. Along with blast shelters, I believe we might well get the garrison state—though we might get nuclear war first.

This brings me to the value of civil defense as a deterrent. On this I wish only to quote briefly a former colleague of mine who moved to Washington last year. In a recent speech in New York, McGeorge Bundy, Special Assistant to the President for National Security Affairs, said: "Within the framework of the concept of deterrence, civil defense simply does not make sense. It is not the efficient way of spending the deterrent dollar." I agree with Dean Bundy; I would only add that shelters aren't a good way to spend any dollars.

Mr. THOMAS. May I say that our colleague, Congressman Boland of Massachusetts, has been with us all morning. He was most anxious to hear your statement, but he was called out of the committee about 15 or 20 minutes ago. He asked us to express his regret that he was not here at the time you came in, but he is very anxious to read your statement. We will confirm what he thought, that it was very excellent, it was most analytical and very helpful to the committee. We want to thank you and your distinguished colleagues for taking the time to prepare such a fine statement, as well as the one that you left with the committee.

Mr. RHODES. Professor Cavers, am I correct in assuming you are not only against shelter programs but you are against all civil defense?

Dr. CAVERS. I think that the role of civil defense in the posture of our weapons today is a fairly limited one, and it would seem to me at this stage that it could perhaps confine itself to concern with the problems of governmental organization, where you do not have to reach into the citizenry and inflame, worry, create anxiety, and divide the communities. I think a limited sphere of action of that sort would not have the hazards that it seems to me are involved in a mass program, wouldn't have the costs involved and it seems to me a part of governmental operations to study that part of it.

Mr. RHODES. What is your idea as to how best to prevent a nuclear war? I assume you advert to the possibility that there could be such a thing, although this article starts out and says something which I

think is absolutely true. I will read it; it says: "If a nuclear war is started, it will be because those in authority on one side or the other are either misinformed or mad." I think that is absolutely right. We cannot assume we are dealing with sane people always. If we are not dealing with sane people what is the alternative?

Dr. CAVERS. I think the problem is calculating risks. Is a program of the kind we have considered one that has any effect on the likelihood of nuclear war? Some people have analogized the shelter program to safety belts. I say the question is, Is this a safety belt that interferes with the driving? I am afraid that it does. If you have that kind of a safety belt, I think maybe you are wiser not to take what seems to be a precaution but may actually be a danger. I would hope we would be able to continue a stronger deterrent until we got the other side around to the point of agreeing to cut back.

Mr. RHODES. In other words, a strong physical deterrent, keeping the pressure on communism in the belief that our system fundamentally is better than theirs and will be proved to be over a long period of time? Is that a fair statement?

Dr. CAVERS. I think if we can avoid having the kind of miscalculations and misjudgments, not only of physical effects but motives and purposes over this intervening period that we have got the better system and this will have its effect.

Mr. RHODES. Suppose you were convinced that the Russians were building blast shelters, as distinguished from fallout shelters? Would you change your mind about what we should do?

Dr. CAVERS. I would if I saw a big blast shelter program going up over there. I think I would actually be worried about it. This kind of a program, it seems to me, is fearful, and I think they would be entitled to fear ours and we would be entitled to fear theirs. We have in effect a curious form of arms control by tacit agreement on the civil defense side, with not very much done on either side. I think that is probably the best situation until we begin to get out of this hole instead of having a civil defense arms race on top of the other one.

Mr. RHODES. Thank you.

Mr. THOMAS. Doctor, you quoted Dr. McGeorge Bundy. He is quite a learned gentleman. I have had the privilege of meeting him several times. His statement was pretty much to the point, was it not?

Dr. CAVERS. I thought it was a very candid and illuminating statement.

Mr. THOMAS. Thank you for coming to see us. We are deeply indebted to you for your very clear-cut statement. We appreciate it.

CIVIL DEFENSE

Mr. YATES. Mr. Chairman, I have an open letter to the American people entitled "We Favor Civil Defense" which was printed in the Chicago Daily News, January 25, 1962. It was sent to me by Mr. Jerome J. Steerman, of the Department of Physics of the University of Illinois, to be incorporated in the hearings. I would like to insert it in the record at this point but omit the 169 names.

(The letter follows:)

We Favor Civil Defense

An Open Letter to the American People (Including President Kennedy and Members of Congress)

We are deeply disturbed by the statements contained in the open letter to President Kennedy about civil defense which has appeared as a paid advertisement in various newspapers throughout the country.

Although the letter seeks to inform the public, it unfortunately contains implications and technical inaccuracies which tend to misinform. The letter rightly urges peaceful efforts to solve international problems; however, it could engender a spirit of despair which would make us victims of easy conquest. There is a danger that the American people will become so pessimistic that they will fail to make necessary mental and physical preparations which could insure the survival of our society if a thermonuclear war were forced upon us.

Still further, it would be unfortunate if the American people were to feel that all university faculty believe that a civil defense effort is futile. Most of us who have seriously considered the technical aspects of thermonuclear weapons effect and methods of protection agree that much effective protection can be provided at a cost which is not prohibitive.

We are deeply disturbed by the fact that individuals can seriously believe that building a completely passive defense is more likely to precipitate an attack than the construction of offensive weapons systems. We believe the benefits of building an effective passive defense far outweigh any improbable increase in tensions which might result therefrom.

It would be tragic if adequate civil defense were discouraged by the injection of moral issues having no bearing on the value of shelters. Let us examine the pertinent moral issues. Would it be moral to risk condemning millions to needless suffering and death on the gamble that war will be abolished for all time? Would it be moral to deny the opportunity for survival to millions because some believe that life after a thermonuclear war will not be worth living?

We do not agree with the disturbing view that "working for peace" and civil defense are mutually exclusive. Actually, a strong civil defense system which can reduce the profit of a surprise attack significantly, might well reduce the chances of war.

Space does not permit a full discussion of all the technical points which should be made in reply to the letter. The following will have to suffice.

1. It is technically false to state that a 100-megaton bomb would cause suffocation of most of the people within a 60-mile radius. The letter implies that detonation of a nuclear weapon over any city will inevitably result in the development of a fire storm. This is not so. Suffocation can occur in fire storms but fire storms can occur only in areas having high concentrations of readily flammable materials such as the blasted areas of some highly congested cities or areas of coniferous (but not deciduous) forests. The buildings in suburban areas and most small cities are sufficiently far apart that the development of a fire storm is extremely unlikely even if the buildings do burn. Furthermore, it is possible to construct shelters which will protect occupants even in an area enveloped by a fire storm. It is also possible to take prior action which will reduce the probability of a fire storm.

2. Although unprotected people could easily be injured or killed by blast or thermal radiation at a distance as great as 18 miles, they could survive in relatively inexpensive shelters as close as 5 miles from a 100-megaton burst. Such structures have actually been built and tested at corresponding blast pressures. At greater expense, shelters can be built to insure survival at half that distance.

3. Civil defense does not require living indefinitely in an underground fortress.

4. Those who have studied the topic have a good idea of what the state of affairs would be a day after an attack. Such studies form the basis for urging preparation for such an eventuality. There is convincing evidence that the problems of survival, while great, are not insurmountable and do not provide an adequate reason for giving up hope.

5. Although more needs to be done, a great deal of planning has been carried through to solve the postattack problems. Plans have been made to maintain our Government and social institutions and to stockpile food, medical supplies, tools, and other essential supplies for survival and recovery. The public has not been interested in these plans until recently and hence has not become familiar with them.

6. Civil defense is not a significant deterrent at present because it exists primarily on paper. However, a functioning civil defense would be a deterrent.

7. The desirability of civil defense does not hinge on the question of limited war versus all-out war. Civil defense is necessary in any event to reduce casualties. The individual with a shelter available should feel safer because he has significant chances of surviving anything but a direct hit. His chances are poor without a shelter.

Both community and family shelters have their place in the overall plan. Neither type provides the best answer for all areas and conditions. Since community shelters generate a spirit of cooperation, they offer an effective means of preserving a desirable social structure and thus are probably best for business areas, schools, and other areas of high population density. For other reasons, family shelters may be best for rural and some residential areas.

We may all disagree on the probability of war, whether slight or great, but facts force us to admit that it is possible. History proves beyond argument that some men can be unspeakably inhumane to their fellows.

In summary we believe that our Nation must continue the race for peace by all means consistent with the survival of our society and our ideals. However, we must recognize that in spite of sincere efforts, there is a possibility that war will occur. We believe it is not morally defensible to offer our entire population as a sacrifice to demonstrate our good intentions. We know that it is possible to protect much of our population against the effects of nuclear weapons. We are in favor of a comprehensive civil defense program.

Office of Emergency Planning and the Office of Civil Defense Appropriations

WITNESS

GEORGE D. RILEY, AFL–CIO LEGISLATIVE REPRESENTATIVE

Mr. Thomas. We have with us this morning our good friend, George D. Riley, legislative representative of the AFL–CIO.

We are pleased to have you here, Mr. Riley, and you may proceed in any manner you wish.

Mr. Riley. Recognizing the gravity of the international situation, the AFL–CIO welcomes this opportunity to present our views in support of the fiscal year 1963 appropriations requests of the Office of Emergency Planning and the Office of Civil Defense, Department of Defense.

As nuclear weapons of incredible destruction are developed, new problems of preservation are created. We scarcely have time to learn what they are, much less do anything about them. But do something we must. With the advent of this advanced weaponry, we are confronted with the inadequacy of the established concept of emergency planning and with demands for new requirements for postattack plans and programs.

We cannot hide from the facts. Workable plans and facilities must be ready for a possible event we prayerfully hope will never occur. The Office of Emergency Planning is the agency we must look to for these plans and provisions. In our humble opinion, it has been and is doing an outstanding job in this respect.

This brings us to the matter of appropriating funds necessary to enable the agency to continue performing these valuable services. The consuming public has learned that anything of quality cannot be purchased cheaply. So it goes with Government functions. However, considering the vital role played by the Office of Emergency Planning as a staff arm of the President, with its multitudinous duties in the area of defense mobilization, in administering the Disaster Relief Act (we need but look to the magnificent job in the recent Hurrican Carla), in the field of telecommunications, and in the

programs to sustain the Government structure under any emergency, the total request of $8 million for the operation of day-by-day functions of the agency seems so exceedingly modest that I shall not burden you gentlemen with repetitious detailing. Suffice to say, we strongly urge that the full amount be appropriated.

We do, however, emphasize the utmost importance of providing ample funds for their newly instituted program of postattack planning. Three million dollars is requested to finance economic and resource surveys at the State and local levels so that governments at those levels may develop the capacity to manage their own resources and economies following enemy assault, until Federal direction and control can be established.

Conjure, if you can, the chaos attendant upon a massive nuclear attack, with over one-third of our productive capacity destroyed or disrupted, and with the Federal Government temporarily unable to regulate or administer its responsibilities. Although a good part of our land may lie in ruins, there will no doubt be islands of survival in only partly damaged or undamaged areas. With no immediate Federal aid and direction available, our destiny as a Nation will be determined by the ability of States and local communities to allocate, control, and distribute such resources as food, medical supplies, and all sources of power; provide essential transportation and communication services; stabilize the economy; control monetary and credit systems; and administer measures for equitable distribution of requisite items.

It is imperative, under present world conditions, that these proposed surveys be undertaken at the earliest possible date. For, as stated, the survival and recovery of our Nation following attack may well depend upon the States and communities having the necessary experience, plans, and organizations to manage their resources and economies until the Federal Government can take over.

With anticipated personnel and facility assistance to be provided by the States, it is estimated that in fiscal year 1963, 15 States and 30 local geographical areas may be studied and planning efforts be developed that would be consistent and compatible with national policies and plans.

We cannot imagine a project more necessary and vitally essential to the preservation of our country.

ACTION TO PLUG UP CREVICES IN THE DEFENSE WALL

To obtain and administer an effectively operational program to provide the shelter facilities the Nation requires will involve all the proposed procedures and devices already set forth by the Department of Defense including:

Financial assistance to the States. Emergency operations. Warning and detection. Operation and maintenance. Shelter incentives. Shelter research and construction. Adequate designation of shelter in existing structures after survey and marking.

These all are vital to the overall plans for providing cover for our population which the AFL–CIO has long urged and has worked consistently to see is provided. What we propose here in the Committee on Appropriations is that the full sums be provided in order that the general program be carried to full conclusion in the shortest

possible time as a prime deterrent to any potential enemy which might find encouragement from possible crevices in our line of defense to protect our civilian population.

There have been some occasions when, from certain sources, we have been told conflicting stories as to whether the Russians have been building their civilian defenses. Only recently, the Russian Premier has found occasion to say his nation gives little attention to maintaining its civilian ramparts. And more recently, the Premier's wife has given forth in similar phrases.

However, we need only turn the pages of a House report of 1959 to find that, even that long ago, that—

> The Soviet defense doctrine has been oriented for nearly three decades toward conventional bombing and chemical attack.

As of that year, these are some of the steps taken by the Russians to defend the civilian population:

> (1) Authorities have a voice in approving blueprints for new construction, with general instructions given by those authorities to architects designing buildings.
> (2) In case of attack, residents continuing to work in cities are expected to use roofed trenches, subways, shelters with reinforced concrete roofs (often in basements), and other similar measures.
> (3) Procedures originally set up against poison gas have been adopted with only slight modifications for use against radioactive dust (fallout). In this regard, says the report, "secret civil defense equipment has been hinted at in Soviet publications."
> (4) As for training, the Soviet Union has an extensive compulsory program underway to train the population as a whole in the fundamentals of civil defense, through courses involving lectures and practical training. They claim the majority of their citizens have had at least 32 hours of civil defense instruction since 1955 and that even more training would be provided later.

Whether we are up to or ahead of the Russians in civil defense may well be open to much argument. The fact is, the Russians are busily engaged, according to information, in preparing against attack.

Planning, training, shelters, programs, organization, designation of authority, all these and others have been part of the preparation of other nations as well.

Because other populations are doing or are not doing the needful in itself is sufficient to cause us to move and to keep moving, of course. The estimate of numbers of survivors in case of attack vary, which is reason in itself for trying to disprove the estimates when we start counting those we will have left following an eventuality.

CONCLUSIONS REACHED AT OUR 1961 CONVENTION

In the clearest possible language the delegates to the AFL–CIO biennial convention remarked upon "the immoral resumption of atmospheric testing by Soviet Russia," which has "increased the danger of the world and has polluted the air with the results of the Soviet Union's attempt to terrify all peoples with its power."

Our convention further foresaw that "the possibility of thermonuclear war is indeed terrifying, because the American people know that such a war would make possible the reduction of the United States, Soviet Russia, and other countries to veritable wastelands in wide areas."

We have been told that while millions will die, some can survive if proper civil defense measures are taken. The convention resolution observed that "as of this date, however, there is within the Nation

a mass of confusion and consternation concerning the dread threat. There has been no all-out massive preparation for the possibility of survival."

The AFL–CIO has long and consistently maintained that a single word fully expresses our concern for civil defense preparations to be as adequate as possible. This word is "survival."

Further quoting from our resolution it should be observed that "the President of the United States has sent out two calls to action for a civil defense program, as essential to protect the people against the dangers of accidental war. Congress approved his request for more money to the Office of Civil Defense Mobilization to embark upon a fallout shelter program, its initial work to identify and mark shelter space in existing buildings over the country and to stock the spaces with emergency food and water rations."

The President transferred the civil defense function of OCDM to the Department of Defense and assured the American people that vital information would be made available on the means necessary for increasing their chances of survival.

We commend the Holifield Military Operations Subcommittee of the House Committee on Government Operations for its thorough and incisive inquiry into where we are going and the purposes involved in civil defense affairs, including the hearings held early in 1962.

For an entire decade, the subject of responsibility for civil defense has wavered all the way from attempting to fix such responsibility upon local and community authorities to joint authority as set forth under Public Law 85–606.

We have outlived the earlier confusion concepts of civil defense which involved "dispersal-or-dig-in." Gradually the Federal Government has assumed its logical and rightful prime responsibiltiy for defense of the Nation in all its aspects, not excluding civil defense itself

Our convention ratified eight concise and clear proposals for a civil defense program which we are pleased to offer for the record at this point:

1. Total Federal responsibility. We reject the policy of the Eisenhower administration, that the fallout shelter program is basically an individual problem. It is unthinkable that the Federal Government does not have the sole authority to provide whatever safety from external attack that it is capable of accomplishing.

2. A group shelter program. The practicalities of the situation preclude the feasibility of an individual shelter program except as an adjunct. Moreover, complete reliance on individual shelters would rule out dwellers in big cities, apartment and hotel dwellers and millions of families with houses and grounds unsuited for shelter construction.

3. Adequate information and training provided by the Federal Government both in educational material and in competent civil defense leaders.

4. Adequate warning devices. The NEAR program if feasible, should be universally placed in operation by all electric utilities. Its costs should be weighed against its disadvantages and financing methods should be thoroughly studied.

5. The Federal Radiation Council, established under a 1959 amendment to the Atomic Energy Act, should be made an administrative, not an advisory radiation agency. It has accomplished little or nothing thus far, but with an adequate staff and operating as the central agency to gather radiation data and establish norms of radiation exposure, it could cut through the diverse and conflicting interpretations and compartmentalized operations in the field of radiation.

As such, it should be responsible for a widespread and more effective program of measuring radioactive fallout and its effects on human beings, make its reports public, submit annual reports to the President and Congress, together with rec-

ommendations based on increased scientific knowledge and need for better programs.

6. Government control over construction of destructible high buildings in cities and Federal, State, and local control over new buildings such as schools, hospitals, office buildings, to make certain that they all contain adequate shelter space.

7. We urge the President by firm policy, to prevent a civil defense program from being watered down and subjected to the calls of the military preparedness program. We are not convinced that the Defense Department can carry out the civil defense mission without downgrading and interference by the military.

8. As we have said at the outset and, as the President so cogently put it, civil defense and dependence on our nuclear weapons for the security of the American people and the peoples of the world is no substitute for peace. We therefore urge again that an equivalent effort be made by our best and ablest men and women to explore and expose to public debate, every possible means of lessening international tensions, and of building the institutions of world law and order.

LABOR'S CONCERN, POLICY, AND ROLE IN CIVIL DEFENSE

Civil and defense mobilization, as we know it today, had its origin in a letter sent by an official of an international union to President Roosevelt in 1940, pointing out the need for an organization in Government charged with the civilian defense of the United States.

As the largest segment of the American population, labor has a tremendous stake in the success of civil defense, not only as citizens prepared to bear their responsibilities but numbering those who are charged with the responsibilities of repairing man-created damage which must be minimized or repaired in order that we continue to maintain our national fabric and entity.

Labor is convinced that there must be a continuity of civil defense operation as a prime consideration. The AFL–CIO has consistently supported and urged a continual manning of the civil defense ramparts. We have recognized the danger as inherent, apparent, and real. We are increasingly concerned lest there be even the slightest letdown in any phase in maintaining vigilance on the civil defense front.

We have maintained our active promotion of civil defense over the years in spite of the sharp sniping from some who have shown a blithe ignorance or disregard of the facts and of necessity and who have attempted to downgrade civil defense as a remote, secondary interest and need in time of national stress.

To quote the words of President Kennedy in his message to State civil defense directors (March 14, 1961):

> The primary objective of civil defense, survival of our people in the event of nuclear war, is of utmost importance to our Government and to every person in the United States. Protection of our population should be the basic concern of every American who loves his country above his own personal gain. Each one of us should actively seek to give wholehearted support and participation of our local civil defense corps and its objectives. Survival in disaster can be achieved by each of us only when we join hands together in a team effort for mutual protection. Civil defense cannot give us survival until we give civil defense our service in the interest of our families, children, and Government.
>
> As a team for survival, we must accomplish more—much more—than we have accomplished in the past. Time is becoming urgent and unless each of us prepares now, our freedom of choice could very well slip from our grasp. Civil defense is our Government in time of emergency; it will be the very heartbeat of our lives when we need it the most—in enemy or natural disaster. In this most essential and urgent undertaking, let us believe firmly that it is not what civil defense can do for us, but what we can do for civil defense. Through our civil defense program, let us think and work to survive, that our work alone may represent a strong and effective deterrent to any enemy who may rise against us.

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Representatives of organized labor have been assigned to and have worked closely with civil defense at the national level from its inception. The No. 1 resolution of the merger convention of the AFL–CIO in 1955 was on civil defense.

AFL–CIO policy, as adopted by the merger convention, briefly stated is:

(1) Civil defense must be the responsibility of the Federal Government.
(2) Civil defense and military defense combine to make a total national defense.
(3) The AFL–CIO offers its resources, leadership, and manpower at the national, regional, State, and local level to the civil defense effort of the United States.
(4) Civil defense is a national survival program, born of necessity, to provide emergency action in natural and manmade disasters.
(5) Civil defense must be a cooperative effort between Government, labor, and industry, based on the American concept of equal partnership and equal responsibility for all who share equal danger.
(6) Direction of the civil defense programs must not be abandoned or delegated to the military in the event of martial law or enemy attack.

CONCLUSION

Fallout respects no person, no place. But there is a defense against it—fallout shelters. As simply as we can put it, millions of lives can be saved with adequate fallout shelters. This is the conclusion of the National Academy of Sciences; it is the conclusion of the National Bureau of Standards; and it is the conclusion of medical authorities and the Office of Civil Defense, Department of Defense.

It is the consensus of all who know: This Nation can survive a nuclear attack.

While initially, after an attack, 75 percent of our land area could be covered with a radiation hazard—this is reduced to 25 percent after 48 hours— and to 7 percent after 2 weeks.

Today, we are getting this information to the people, and in greater numbers than ever before, the people are responding by taking the steps necessary for individual survival.

Against this backdrop, we have urged that members of organized labor—

(1) Talk and practice civil defense. (Our statements and resolution of position have been set forth with clarity.)
(2) Promote civil defense training in programs of education sponsored by their organizations.
(3) Encourage all labor organizations to participate in civil defense preparedness at all levels.
(4) Take individual responsibility—construct their family fallout shelters, and assist the responsible officials in their areas in planning and working for community and school shelters.

In all of these things we are ready to assist. We do not take the defense of freedom for granted. We can buy and build its sinews—the guns, the planes, and rockets; but we cannot buy its substance—a substance rooted in a heritage of sacrifice and duty.

By individual preparedness, we contribute to this Nation's security—and above all we contribute to the cause of lasting peace.

Once more, we are in unison for the request set forth in the proposed estimation as submitted in the budget for fiscal year 1963, including some $695 million for operational functions now assigned to the Department of Defense.

Mr. THOMAS. Thank you, Mr. Riley. We are also in receipt of a statement from Mr. C. J. Haggerty, president, Building and Construction Trades Department, AFL–CIO, which we will include in the record.

(The statement follows:)

STATEMENT OF C. J. HAGGERTY, PRESIDENT, BUILDING AND CONSTRUCTION TRADES DEPARTMENT, AFL–CIO

My name is Cornelius J. Haggerty. I am president of the Building and Construction Trades Department, AFL–CIO, which represents over 3½ million building trades throughout the country. The Department is made up of 18 international unions of the building industry.

I would like to preface my remarks by a few short exceprts from President Kennedy's special message to Congress on national needs (May 25, 1961).

"* * * It is on this basis that civil defense can be readily justifiable—as insurance for the civilian population in case of an enemy miscalculation. It is insurance we trust will never be needed—but insurance which we could never forgive ourselves for foregoining in the event of catastrophe.

"* * * But no insurance is cost free; and every American citizen and his community must decide for themselves whether this form of survival insurance justified the expenditure of effort, time and money. For myself, I am convinced that it does."

This Department gives wholehearted support to the President in this program and we support the requested appropriations to implement this "insurance" program. The Department supports the position of the American Federation of Labor—Congress of Industrial Organizations and we associate ourselves with that position.

Because we are of the building industry, it might well be thought at first glance that we support the shelter construction program because of economic self-interest. But this is not the case.

For example, in the last 2½ years building trades have built 195 demonstrator family fallout shelters in 183 cities at no cost to the Government. Members ot the building trades unions donated their labor free for the demonstrator shelters.

In addition, union building tradesmen have donated their skills to the erection of temporary fallout shelters which were shown at homebuilders' shows, fair grounds, and exhibitions. It is estimated that over 10 million persons have visited these shelters. In this connection some of the Members of Congress might recall that at the AFL–CIO union label industry show here in the Nation's Capital, a fallout shelter was demonstrated and moreover the money to build a similar shelter was given as a prize at this union label show.

Our unions have also responded to President's message (quoted above) in their trade union publications urging the importance of this program.

I know I speak for all building trades union members involved when I say we were happy to have the opportunity to donate our services to our Government in this matter. I could point out other contributions building tradesmen have made in time of national disaster, such as hurricanes and floods. I could point out the free labor donated to the community projects such as boys' clubs, camps, or community centers. We were glad of the opportunity to be of service to the community there and we are happy to be of service in the shelter program as American citizens.

The details of this program, of course, can be left to experts but as building tradesmen and as citizens we support the President when he sounds the call of national need for fallout shelters.

The size of the civil defense budget request of $695 million is a matter for experts. If the committee and the Congress feel the shelter program which accounts for half this amount is unfeasible, then any amount of appropriation is waste. If on the other hand Congress is convinced of the urgency and necessity of the program, then perhaps the amount is too small. It is a determination to be made by the Congress, but we do urge the Congress to keep in mind the effect congressional action may have. Our small efforts to publicize and build demonstration fallout shelters will die, of course, on the vine if the public learns that the Congress does feel the program is unworthy of support.

Civil Defense

STATEMENT OF THE AMERICAN LEGION

Mr. Thomas. The committee is in receipt of several statements concerning civil defense. The first, from the American Legion, is by Mr. James A. Wilson, Jr., Director, National Security Commission of the American Legion. Insert that in the record at this point.

(The statement referred to follows:)

Statement of James R. Wilson, Jr., Director, National Security Commission of the American Legion, in Connection With the Office of Civil Defense Appropriations for 1963

Mr. Chairman and distinguished members of the subcommittee, my name is James R. Wilson, Jr. I am director of the National Security Division, one of the full-time administrative branches of the national organization of the American Legion.

I appreciate the opportunity to appear before this distinguished subcommittee to support the budget for both the Office of Civil Defense and the Office of Emergency Planning.

The American Legion has, for many years, supported a strong program of civil defense, and has been actively engaged in many phases of it. We consider a sound, effective program of civil defense to be an essential complement to our military forces; both serving as deterrents to possible attack. The deterrent value of civil defense preparedness, in preventing enemy attack, in my opinion outweighs the benefits derived from the lives saved if deterrence fails and the Nation is attacked. It is, therefore, reassuring to see the vastly increased emphasis placed upon civil defense during the past year. A clear national policy has been outlined, which, if implemented, should provide an added measure of protection against nuclear attack.

Responsibilities have been clearly delineated between the Office of Emergency Planning and the recently established Office of Civil Defense, both of which have important duties to discharge that must be adequately funded.

The most encouraging of recent developnent has been the growth of public understanding and support for civil defense. This public interest must not be allowed to diminish. It must be strengthened through a comprehensive information, education, and organization program. Last year sufficient appropriations were provided to make a significant beginning. However, in order to continue the program at an accelerated level this year, greatly expanded funds are required. The requested appropriation of $695 million for OCD and $11 million for the Office of Emergency Planning will enable civil defense agencies of responsibility to move toward the completion of vital phases of the program as quickly as possible.

Top priority must be given to completion of the Federal shelter survey, identifying and marking shelter spaces. Equally essential is the task of stocking them with food, water, first aid supplies and radiation detection meters, so that they become effective shelters capable of weathering the crucial periods following enemy attack. Priority should be assigned to the new Federal shelter incentive program so as to provide additional fallout protection in schools, hospitals and welfare facilities. We endorse this program under which financial grants will be made to institutions to modify existing facilities or incorporate shelters into new construction.

The American Legion strongly urges that this program be expanded to include incentive allowances for other new construction and modification. Many American Legion posts and departments (State) headquarters buildings are uniquely suited for modification and incorporation of group shelters. I am inclined to believe that some incentive is required to stimulate the construction of private shelters by families, business firms, and private organizations. In addition to the cost of the shelter itself, these individuals and organizations are penalized in the form of increased local property taxes. It seems reasonable to assume that increased shelter construction would follow the elimination of such local taxation. Thought should be given to the advantage of tax deductions for the cost of building, stocking, and maintaining family or community shelters.

Equal in importance to the shelter program, although not so much publicized, is the requirement for an improved system of warning and communications so that the maximum number of people will have time to seek protection prior to attack and will be able to keep informed during and after attack.

Under the Office of Emergency Planning budget, we attach particular importance to the studies and development of post-attack plans to provide for continuity of government and to the development of State and local plans for post-war resource management and rehabilitation.

In this regard, greater stimulus should be given to the State and local governments to amend their statutes to provide for a greater depth of government in event of attack. As an organization, the American Legion has worked closely with the Office of Emergency Planning in supporting the enactment of legislation at the State level to assure that government will continue to function following assault upon the United States.

One area in which we feel more emphasis should be laid is the field of public information and education. While much has been done in this direction, a myriad of misinformation continues to persist in the public mind. Misguided and some sources who do not wish this Nation well, have spread the "Rather Red than Dead" philosophy. Others have blown up the fallout myth all out of proportion to the facts. The Government must take the lead in dispelling these false ideas and in gaining increased public recognition and support for civil defense.

Organizations such as the American Legion can be of great value in educating and training the public and in organizing community effort. Our organization already has in being an extensive program to organize, train, and equip light duty rescue teams. Soon we will embark nationally on a fallout shelter construction program through our 17,000 posts and 2,700,000 members. Every day we carry on an informational program through which we actively promote civil defense awareness across the Nation. In addition, we have long sponsored the American Legion blood donor program which would, should the need arise, provide a ready source of whole blood.

The actions taken by the Government in the past year are directly in line with many of the American Legion's long-standing mandates and policies. For example, at our 43d annual convention last September resolutions were adopted strongly urging increased financial support by the Federal Government to State and local governments and individuals, accelerated and broadened education and training programs, establishment of a nationwide fallout monitoring system and attack-proof communications system, and preparation of postattack plans to assure national recovery. Copies of these resolutions unanimously adopted by our 1961 national convention which met in Denver, Colo., are appended to this statement.

On behalf of the American Legion, I thank you again for this opportunity to appear before your subcommittee in strong support of the appropriations requested for the Office of Civil Defense and the Office of Emergency Planning.

[1961 National convention of the American Legion, Denver, Colo., September 10–14, 1961]

Resolution: No. 289.
Committee: National security.
Subject: Nationwide construction of individual and community fallout shelters.

Whereas the President of the United States, the Secretary of State, the Joint Chiefs of Staff and the Director of the Central Intelligence Agency, have publicly declared that civil defense is an integral part of America's deterrent capability to discourage attack and to withstand nuclear blackmail; and

Whereas a nationwide construction of individual and community fallout shelters would constitute a powerful deterrent to enemy attack and reduce casualties by tens of millions should the Nation be attacked; and

Whereas prototypes of economical family and community fallout shelters have been developed and a national program could be initiated immediately; Now, therefore, be it

Resolved by the American Legion in 43d Annual National Convention assembled in Denver, Colo., September 10–14, 1961, That we call upon the Congress and the President of the United States to declare a national policy of civil defense to encompass the following:

A. That every American citizen should be encouraged to have effective fallout protection as promptly as possible.

B. Cooperative financial support by the Federal Government to State, local governments, and individuals to provide adequate fallout protection, including, but not limited to fallout shelters in new construction using Federal funds, loans, or guarantees.

C. Accelerate and broaden education and training programs to instruct the public in warning and protection procedures for nuclear attack.

D. Support the appropriation of Federal funds for the establishment of a nationwide, fully automatic radioactive fallout monitoring system supplemented by an attack-proof communications system to contact shelter occupants.

E. Preparation of postattack plans to assure national recovery by providing for: decontamination; water purification; rationing; prepositioning and distribution of food, shelter, clothing, medicine, and other essentials for survival and for the employment and relocation of the surviving populace.

Resolution: No. 361.
Committee: National security.
Subject: Urging American Legion posts to take an active role in civil defense.

Be it resolved, The American Legion, in national convention assembled, September 12–14, 1961, at Denver, Colo., reaffirms and reemphasizes its position that the national commander call on every Post in the Nation to take an active role, in the civil defense and preparedness of city, State, and Nation, subject to military and civil authority.

Resolution: No. 171.
Committee: National security.
Subject: Support the national policy on fallout shelters.

Whereas, extensive tests and studies have been made of protective measures to safeguard people against the effects of nuclear weapons; and

Whereas, in the event of a nuclear attack on this Nation, fallout shelters offer the best single nonmilitary defense measure for the protection of the greatest number of people; and

Whereas, there is resultant indication that use of shelters for fallout protection provides a vast potential for saving lives; and

Whereas, the Office of Civil and Defense Mobilization has formulated a national policy on shelters for fallout protection; and

Whereas, State offices of civil defense have adopted programs consonant with the national shelters policy;

Now, therefore, be it

Resolved, That the American Legion, in national convention assembled in Denver, Colo., September 10–14, 1961, support the national policy on shelters and recommend that all members prepare their houses against the threat of fallout, and, having set the example, further demonstrate their leadership by urging the rest of the community to take similar action.

STATEMENT OF WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM

Mr. THOMAS. The Women's International League for Peace and Freedom also has a statement on civil defense which will be included in the record at this point.

(The statement follows:)

STATEMENT OF THE WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM

The Women's International League for Peace and Freedom believes that there is no defense against war except the abolition of war.

"Civil defense gives the sanction of action to the delusion that a thermonuclear war can be fought and survived."[1] Plans and proposals for civil defense are altered as facts and prospects for survival change. But the blueprints for it cannot keep up with the increase in destructiveness, the variations and refinements of strategic nuclear vehicles, nor with the developments for chemical and biological warfare. A new set of weapons uncovers a new set of facts, and the lag in preparation for defense renders every effort obsolete before it can be completed. Worse, each increase in socalled defensive measures only invites the enemy to further increase his attack level. The stark fact is that no adequate defense program can keep pace with the escalating threats of ever bigger and more horrendous weapons.

How to defend ourselves then? The Women's International League sees prevention of war as the only guarantee of survival.

Thus all responsible attention and energies must be utilized to avert the "Death of Earth." Concern with an illusion of safety diverts valuable and earnest effort away from confronting and handling the real crises. "It disengages the citizen from vigilance over the rationality and responsibility of his elected officials."[1] Participation in the shelter program is based on the assumption that war is inevitable. This for ourselves and our adversaries, is the acceptance of death before the choice is made. It is already evident that such a program sets up delusions which corrupt human beings in their relationship to each other, to their country, and to their Nation's economy.

The Women's International League for Peace and Freedom therefore urges, not a blueprint for a destroyed Nation, but the abolition of war and all preparations for war as the only alternative to a totally unrealistic program of civil defense.

STATEMENT OF DISABLED AMERICAN VETERANS

Mr. THOMAS. The next transmission on civil defense is from Francis R. Buono, national commander, Disabled American Veterans. We will place this in the record.

(The statement referred to follows:)

DISABLED AMERICAN VETERANS

Hon. ALBERT THOMAS,
Chairman, Subcommittee on Appropriations, Committee on Appropriations, House of Representatives, Washington, D.C.

DEAR MR. THOMAS: The Disabled American Veterans, as an organization of the wartime disabled, is devoted to the welfare of our great Nation and is deeply interested in all aspects of national defense and the perpetuation of our system of government. Enclosed herewith are copies of Resolutions Nos. 19 and 370 relating to the above subject with emphasis upon underground shelters and a strong civil defense program.

Knowing your own deep interest in civil defense legislation and the appropriations required for its proper conduct, both under the activities as heretofore administered and now that civilian defense has been taken over by the Department of Defense, I desire to invite your attention to two pending bills that we believe are most meritorious and deserve the support of the responsible committees and of the Congress itself. The bills in question are S. 2857, to authorize payment toward the construction or modification of approved public shelter space, and H.R. 10262, of similar content.

In submitting this statement for the record we desire you to know that the above-mentioned bills have the unqualified endorsement and support of the Disabled American Veterans.

Sincerely yours,

FRANCIS R. BUONO, *National Commander.*

[1] Scientific American, November 1961, Gerard Piel, publisher of Scientific American, speaking on "The Illusion of Civil Defense" before the Commonwealth Club in San Francisco.

RESOLUTION NO. 19. LEGISLATION FOR UNDERGROUND SHELTERS AND STRONG CIVIL DEFENSE PROGRAM

Whereas the advent of nuclear weapons and advanced aircraft, along with nuclear submarines, has caused any area of the United States to become a potential target for enemy weapons; and

Whereas the use of atomic weapons creates lethal radioactive fallout which can contaminate large areas of our United States; and

Whereas the only successful protection against fallout is underground shelters; and

Whereas the additional international situation has reached a point where any aggressor could attack our country with atomic weapons with as little as 15 minutes' warning; and

Whereas public apathy has caused the general public to disregard the meaning of civil defense and preparedness against attack: Now, therefore, be it

Resolved by the Disabled American Veterans in national convention assembled at St. Louis, Mo., August 20–25, 1961, That we strongly urge that Federal and State legislation be adopted to insure a strong civil defense program; and be it further

Resolved, That Federal and State legislation be adopted to insure the construction of underground shelters to provide the necessary protection in the event of a nuclear attack.

RESOLUTION NO. 370. SUPPORT GOVERNMENT IN DEFENSE OF NATION

Be it resolved in national convention assembled at St. Louis, Mo., August 20–25, 1961, That the Disabled American Veterans, an organization of citizens and veterans of the United States of America, fully aware and realizing the dangers that confront our Nation today, offer our wholehearted support to our Government in any and all steps that they may decide to take in defense of our country and in the best interest of world peace.

STATEMENT OF J. A. MOCK

Mr. THOMAS. We also have a statement on civil defense from Mr. J. A. Mock of Hohokus, N.J., which will be inserted in the record at this point.

(The statement referred to follows:)

STATEMENT OPPOSING OFFICE OF CIVIL DEFENSE BUDGET REQUESTS FOR FISCAL 1963

Submitted by J. A. (Jesse) Mock

I congratulate this subcommittee for its prudent action on civil defense measures in the past. I think future years will justify the many reductions you have made in budget requests for this purpose.

Yet, I am sure this subcommittee is aware that reports by the Comptroller General indicate that the sums allowed for civil defense have been diverted into questionable channels and spent without contributing in any meaningful way to the purposes for which they were appropriated. If you had allowed more, perhaps even more would have been misspent.

The past 10 months have seen the rise and fall of the home shelter craze. The administration, itself, has now seen fit to deemphasize the home fallout shelter in favor of the community, or public, fallout shelter. It seems to me that many of the obvious weaknesses of the home shelter program are also apparent in the public shelter program. For instance, there is the same lack of protection against fire and blast effects of nuclear weapons; a more complex question of who shall enter and who shall be kept out of the public shelters; broader opportunities for misappropriation of funds; and the distinct possibility that the presently proposed program could escalate into the billions and even hundreds of billions of dollars.

Once this is fully realized by the American public, I am inclined to believe that this public shelter program will fizzle out just as the home fallout shelter program has. In fact, the lack of interest displayed by the White House for this program would appear to indicate that disenchantment is already beginning.

With this in mind, I hope this committee will carefully consider the Office of Civil Defense budget requests now pending. The present request for some $695 million in new funds is more than triple the $207 million asked last year and is many times the amount allowed by this subcommittee for any single year in the past.

A study of the budget requests for civil defense, when combined with other studies I have made in this field, leads me to the following conclusions:

1. The warning system proposed is of questionable value, has already been mishandled, and is capable of causing severe political repercussions.

2. The financial assistance to States, which in the past has come under fire from the Comptroller General, would provide firearms and target ranges so that the Civil Defense gate keepers of the future would make their own decisions as between the quick and the dead.

3. The shelter incentive portion of this measure is makeshift; patently, perhaps deliberately, inequitable; the opening wedge for a program costing $300 to $400 billion; and would extend the military arm of our Federal Government into our schools, our hospitals, and our welfare institutions.

Warning and detection ($46 million requested)

A share of this would go for the national emergency alarm repeater (NEAR) system. Supposedly this system would utilize the electric powerlines of the Nation to send signals into every individual home in the Nation. A small "black box" would emit a loud buzzer-like signal that would awaken all but the soundest sleepers. This would be the signal to turn your radio to the conelrad frequencies for information and orders. A study of the NEAR system will indicate that it is:

Of questionable value.—First, there have been no studies of which I am aware to show that the NEAR system would be any more effective in many communities than the siren warning system. Second, in light of Defense Secretary McNamara's testimony before the House Government Operations Subcommittee last August 1 to the effect that the warning would come shortly before "or after the attack," there is a grave question as to whether it would be of any practical value at all. An attack that destroyed a part of the vulnerable powerline network would render the NEAR system ineffective. Third, there appears to be a very perplexing question as to whether hydrogen bomb explosions in the stratosphere may disrupt microwave and radar operations. To the extent that the NEAR system would in any way depend upon these two systems, its operations would also be in question. Supposedly one of the purposes of the planned U.S. series of nuclear explosions at Christmas Island is to determine whether such is the case. Yet, this committee is being asked to approve funds for the NEAR system in the face of these fundamental questions.

Has already been mishandled.—Office of Civil Defense officials attempted to pressure electric utilities into undertaking the bulk of the cost of this system and charge it off in higher rates to their customers—a novel scheme of back-door taxing. This has apparently been stymied for the time being. But after 3 or more years of testing the NEAR system on a relatively wide scale, OCD discovered last fall that a current-control device used in homes and stores can create a condition that would readily set off false alarms. This called for a redesign of the system and the tests have to be rerun. Further, there appears to be evidence of very recent policy changes in application of the NEAR system so that it would be on a voluntary system as far as electric utilities are concerned. Electrical World, the weekly trade magazine serving the utility industry, described the situation very succinctly in its December 24 issue: "Confusion Reigns on NEAR."

Capable of severe political repercussions.—The NEAR system, as presently envisioned, will reach into every home, every store, every office, and every industrial plant in the Nation. Any further attempt to charge it off on customers' electric bills would like cause a ruckus that would reach to every political office in the land. If regulations are forged to make it compulsory to citizens, it may even raise constitutional questions relating to the "search and seizure" clause. Because it would touch every citizen, it may well be the most politically explosive item in the civil defense portion of the present bill.

Financial assistance to States ($32 million requested)

Under fire from Comptroller General.—Well over $100 million of Federal civil defense funds have been obligated to States and their subdivisions since 1951. A report from the Comptroller General submitted to a House Government Operations Subcommittee in August of last year indicated that on the basis of a sample investigation, about 62 percent of these funds have gone "primarily for items which

were not over and above the normal requirements of States and their political subdivisions." In other words, Federal funds were being used by States for items they should have bought for themselves. These "civil defense" items ranged from silverware for cafeterias, to police radio systems to helicopters. The Comptroller General's review of 7 of the 12 helicopters bought with Federa-civil defense funds showed that "all 7 were being used in normal governmental activities of the applicants." The investigation further disclosed that two of these seven were used extensively by the applicants for revenue-producing spraying operations for which they had received $97,000 over a period of a year and a half from landowners and the U.S. Forest Service."

Would provide firearms and target ranges.—The use of firearms in certain aspects of civil defense has been depicted by one contemporary cartoonist as arising from the theory, "If you can't kill a Russian, then kill an American." The Comptroller General estimates that from 1953 to 1960 approximately $346,000 has been allocated for police service and indicates the funds has gone "principally" for firearms.

Within recent months there have been stories of "minutemen" organized to protect rural areas from the city folks, Las Vegas from the Los Angeles invaders. Up to now it has not been clearly established that Federal civil defense funds are being used to arm both sides, but the funds allocated could put roughly 6,000 men in civil defense under arms.

Shelter incentive program ($450 million requested)

Program is makeshift.—The Defense Department seeks to justify this program solely on the grounds that it would provide protection against radioactive fallout from a nuclear explosion. No claim is made that it would provide any protection whatsoever against blast or fire effects from such an explosion, although these effects could be much more destructive to human populations than fallout. In fact, witnesses before the Joint Atomic Energy Committee have noted that there need be no local fallout from a nuclear weapon and, indeed, there are no known fallout casualties from the atomic bombs exploded over Hiroshima and Nagasaki. It was the fire and blast and immediate radiation effects that left some 220,000 Japanese dead and injured after those 2 atom bombs were exploded.

Russians could undermine program with propaganda.—Suppose that one day a year from now, after this committee had provided the funds and the Defense Department had committed them, the Russians announced that they had several nuclear-tipped rockets aimed at each of the 65 major population centers in the United States and that each was set for an air blast. With that one statement, the Russians could wipe out any psychological gains which would be made by this bill. If true, the Russian statement would make this bill less than worthless and likely focus the distress of an irate U.S. public upon those who had conceived and approved this makeshift bill.

Patently, inequitable.—By putting an upper limit on the financial assistance for each shelter space, this program would be inequitable as between those areas which ordinarily have cellers or basements in their buildings and those which do not such as Florida, much of California, Texas, and many beach-front towns. It would be inequitable as between more settled areas and those growing areas where new institutions are being built. It would be inequitable as between Government workers and non-Government workers. It would be inequitable as between rural residents and city residents. In short, it wluld be inequitable in the slight protection it purports to offer between those few areas where there are structures capable of some modification and those vast areas where no such structures exist or are planned.

Perhaps deliberately inequitable.—I argue that this program is perhaps deliberately inequitable because I think if such a program were carried out on a wide scale there would be a hue and cry over the way obvious lack of equality even in fallout protection. Thus it is possible that those who conceived this program are counting on its lack of equality to propel it into a vast expansion of shelters that could conceivably lead this country to bankrupt our resources—both natural and political.

Opening wedge for $300. to $400 billion program.—In his February 8 letter explaining this program, Secretary of Defense McNamara said that it must be flexible and comprehensive. Yet there is no indication that the fallout shelters provided could be "flexible" enough to be adapted to provide blast or fire protection. Nor is there any claim made that it would be comprehensive enough to provide protection for those near target areas. If the Defense Department is thinking in terms of a flexible and comprehensive shelter program, the only way to scale the one presently proposed is upward. Prof. John E. Ullman of Hofstra

College has estimated that a degree of protection against the blast and fire effects of an atomic attack would cost some $2,100 to $2,500 per person sheltered. If provided for 120 million persons, the cost of such a program would run between $250 and $300 billion. A segment of these 120 million citizens would be lost because even these high-priced shelters would not withstand the blast waves near ground zero. Thus we see that this modest $450 million program, if either flexible or comprehensive, might escalate into a program roughly the size of a present national debt.

Military control in schools.—This shelter incentive program would open the way for Federal military intrusion into our schools, our hospitals, and our welfare institutions. It would open the way for direct Federal interference in our schools in a way that other school aid bills never contemplated. For what good would the so-called shelters be without training and exercises? How would the exercises be carried out except by regulations? And who would write the regulations except the Office of Civil Defense in the Pentagon?

AMENDMENTS PROPOSED

If this committee should feel compelled to approve a portion of the funds requested by the Office of Civil Defense, I would hope that language would be written in the bill to—

(1) Require that the workability of any warning system be certified by competent authorities before being installed on a statewide basis.

(2) Require that this subcommittee approve in advance any levies against individual taxpayers to compensate for warning devises in homes, stores, offices.

(3) Require that criteria for grants-to-States be approved by the Comptroller General before any funds from this appropriation are made available to States.

(4) Prohibit the use of any funds from this appropriation for purchase, acquisition, or manufacture of firearms or target ranges.

(5) Require that funds for the shelter incentive program be allocated to States on a per capita basis in order to discourage the funneling of the bulk of funds into one or two or a few States.

(6) Prohibit the use of any funds for a shelter incentive program if such shelter space is not to be readily available for occupancy during an exercise or emergency. This would seek to keep the space available for immediate occupancy without the need for annual rents or leases.

STATEMENT OF MR. J. DAVID SINGER

Mr. THOMAS. The last statement on civil defense is transmitted to the committee from Mr. J. David Singer, associate research political scientist, Mental Health Research Institute at the University of Michigan. Mr. Reporter, please insert this statement in the record.

(The statement referred to follows:)

DETERRENCE AND SHELTERS

(By J. David Singer)

(The actual lifesaving potential of proposed civil defense shelters is far from enough to compensate for the dangers they provoke by inhibiting the serious search for nonmilitary alternatives to international conflict; promoting fatalism about nuclear war; and, because of the time needed to reach metropolitan shelters, suggesting to the U.S.S.R. that we are contemplating a first strike.)

After years of indecision and inaction under the Truman and Eisenhower administrations, President Kennedy has moved to get civil defense out of the doldrums. Though the subject had been broached prior to the Soviet Union's resurrection of the Berlin crisis, Berlin was the catalyst leading to the specific $207,600,000 proposals. While it is entirely possible that the program's proposal was merely a trial balloon or another effort to "one-up" the Kremlin in the classical exchange-of-threats fashion, only to be shelved when, and if, the present crisis diminishes, there are many who think that the administration is completely earnest in making these proposals, and who welcome them as a sign of strength

and decisiveness on the New Frontier. As a matter of fact, the reception has been generally affirmative, with the only serious criticism coming from those Congressmen whose major preoccupation is with budgetary frugality and administrative efficiency. Despite the warm response, it is possible that the program will be subjected to closer financial and strategic scrutiny once the euphoria of patriotic unity and deceptive bipartisanship has worn off.

The opening argument often used by civil defense advocates is that such a program would, in the words of a House Military Operations Subcommittee report, play "an important strategic role in helping to deter nuclear attack. * * *" This deterrent effect, it is suggested, flows from the fact that shelter and evacuation arrangements would markedly modify a key variable in the Soviet Union's strategic calculations: The number of Americans who might be killed or incapacitated in an opening attack of certain specified levels. The less damage their attack can do, it is argued, the less likely they are to launch it, whether the damage be to military personnel, civilians, industrial sites, transport centers, or military installations. Thus, if we "harden" our ICBM launch sites, disperse our bombers, or conceal our Polaris submarines, we are allegedly engaging in essentially the same passive defense process as sheltering our civil population.

But is it the same process? In the emerging nuclear-missile era, with the outcome of strategic large-scale war primarily dependent on forces in being, how important is it to preserve those elements which can only affect future capability? If the intent of a surprise attack on North America is to destroy our capacity to severely damage or destroy the U.S.S.R., then the opening salvos are more likely to be aimed at our retaliatory forces in being. The demoralizing and disruptive results of a countercity strike would hardly be worth the weapon expenditure, and as General Le May suggested in testimony before the Military Operations Subcommittee, it would be "foolish to attack the population, as such."

Moreover, American cities and their populations may be more valuable to the Kremlin in the postattack situation if they are left more or less intact than if they had been decimated. Once destroyed, they no longer can be threatened with destruction as a blackmail or bargaining device; as the victim, we would no longer possess something which we value and which the enemy can threaten to obliterate.

It must be acknowledged that even if the aggressor did not intend to strike at our major population centers, he could not fail to hit many of them. Fallout would inevitably drift down upon many cities from the military targets which lie as much as a hundred miles upwind of them. Present and projected guidance systems and map grids are still inaccurate enough to indicate that some warheads will, in missing their targets, produce serious heat, blast, and radiation effects within the urban areas. And, as Ralph Lapp pointed out in the April 1960 bulletin, many missile and bomber installations will continue to be so close to population centers that even an accurate hit will rain considerable devastation upon city buildings and inhabitants. And if the oft-advocated plan for bomber dispersal to large municipal airports is carried out, there will be even greater civilian casualties resulting from direct hits and near misses. And as we harden, disperse, and conceal our missile sites, we compel the attacker to increase the number and yield of his warheads, again adding to nonmilitary damage.

Thus, even if the attacker did concentrate upon our retaliatory forces in his opening salvo, the population centers would still receive a significant degree of heat and blast damage, and an even higher dosage of radiation. Therefore, it is argued, a civil defense program is still necessary, if only for the humanitarian purpose of saving lives. Although the specific question of what types of shelter or evacuation arrangements would protect how many people from what sort of attack is beyond the scope of this paper, it does seem relevant to point out some of the more obvious implications: First, the structural, and production cost, differences between shelters for fallout protection and those intended to protect against heat and blast are tremendous. An individual who would be likely to survive the initial and residual radioactivity of a 10-megaton warhead detonated several miles away, if he is sheltered by 3 feet of concrete, dirt, or sand in all directions, would have little chance of escaping destruction by heat and oxygen loss unless the shelter were drastically and expensively modified. Then there is the question of how long he could remain sheltered, given the radioactivity levels of the environment when he emerged. There is also serious doubt as to whether enough of the basic services could survive to provide uncontaminated water and food as well as necessary heat, power, and sanitation. The postattack social environment is as likely to be one of anarchy, plunder, and murder, as one of order, restraint, and cooperation; only recently a group of Las Vegas citizens

began to organize a militia to protect their property from marauding Californians after the latter had been rendered homeless. Finally, most shelter and evacuation plans seem to assume that the attacker will shoot his bolt in the first salvo, and that no further strikes will follow the opening one; this could, under very specified conditions, be an accurate prediction, but there is at least some probability that most urban centers will experience a sequence of attacks, each of which will superimpose new damage and chaos upon that preceding.

A civil defense program would do little in the way of deterring a major attack upon North America; the best we can say is that, in the event of such an attack, a sizable number of human lives might be saved. The next, and more intriguing question, concerns what certain advocates of civil defense (Kahn, "On Thermonuclear War"; Brodie, "Strategy in the Missile Age") would refer to as the deterrent against nuclear blackmail. That argument runs somewhat as follows:

Deterring nuclear blackmail

In an international crisis or diplomatic showdown such as the current one over Berlin, each side must be able to make, and respond to, fairly credible threats of military action. The protagonist which can make the more credible and terrifying threat will enjoy certain bargaining advantages over the other. If we wanted to persuade the Soviets that we would launch a certain type and level of attack upon their forces or bases or cities if they went ahead with a specific political or military act, they must be convinced that we would carry out that threat. As Kahn puts it, "the Soviet planner asks himself, 'If I make this very provocative move, will the Americans strike us?' " And the less damage we would suffer in retaliation for that strike, the more convinced the U.S.S.R. would be of our willingness to execute the threat. Conversely—and the argument preferred by those who think that only the U.S.S.R. would employ such tactics—if the adversary were to confront us with such a threat, we must be able to persuade him that we will not flinch from it. Again, to the degree that we can protect our population would the U.S.S.R. be expected to be deterred from executing its threat.

Here, however, is one of the points at which various supporters of civil defense are in sharp disagreement. Whereas the Office of Civil and Defense Mobilization and most congressional leaders have given up as obsolete the idea of evacuation, and have instead focused on fallout shelters, those who would use civil defense as a bargaining counter in any nuclear showdown put great reliance on this step. What, they ask, could be more persuasive to the opponent then an evacuation of major population centers? The dilemma is quite real. If one side were to threaten the other's cities in such a "game of skill," evacuation would be the only means of saving these populations. Almost nobody talks seriously of protecting civilians from heat and blast; it is widely recognized that the best we can do is give them some protection against fallout resulting from hits a good many miles upwind. But evacuation would be of very limited usefulness in the event of a surprise attack, since it requires more time and more transport and terminal facilities than we are willing (or able) to provide.

While the operations analysts can talk of civilian evacuation during crises as a bargaining move, those responsible for financing and executing a civil defense program will not provide the resources for a policy which is relatively useless against surprise attack. One might also ask the evacuation advocates how long they would leave the factories, offices, and cities depopulated in such a crisis. Between June 1961 and January 1962 (the Khrushchev deadline on Berlin), New York, Chicago, and Detroit could completely atrophy and industrial productivity could dwindle to nothing. And if we returned our populations to their cities, we would not only be risking these millions of lives, but, if the adversary had not capitulated on the point at issue, we would be implying a marked softening of the hard position we had so laboriously, expensively, and dangerously constructed.

Another problem inherent in this allegedly deterrent use of civil defense is the matter of symmetry. Given the high degree of reciprocity that all competitive relationships engender, we should expect that any attempt to intimidate by evacuation would be responded to in kind. The intended victim of this ploy need only reduce his civil vulnerability to a commensurate degree, and any initial psychological advantage is canceled out. And we should not forget that ecology put the U.S.S.R. in a considerably advantageous position at the outset of such a sequence. Having a far greater dispersal of population and industry, the U.S.S.R. presents fewer valuable, high-priority targets. And, since the same total number of people can be moved out of many cities far more rapidly than out of a few cities, the evacuation technique is both less necessary and more feasible for the U.S.S.R. than for ourselves.

Finally, and perhaps most important, there is the question of what such an act would do to the Kremlin's perception of our intentions. As its advocates point out, the main intent is to suggest to the adversary that we are seriously entertaining the idea of a first strike as a means of backing up our demands or our determination to resist his demands. Inasmuch as such an act would take place in an atmosphere already charged with tension, suspicion, and fear, and this would raise such tensions to an even greater level, this could be just the impetus necessary to drive them to preempt. And if evacuation were coupled with such other ingredients of this prescription as airborne alert of manned bombers, tentative commencement of missile countdown, activation of air defense, and deployment of naval and ground forces, who would want to count on continued Soviet restraint? This version of civil defense offers almost no advantages in the diplomatic face down, and yet markedly increases the probability that the opponent will be provoked into preempting.

We have suggested that fallout shelters would be almost useless against a countercity strike, and that shelters to protect against heat, oxygen loss, airwave and ground shock are too expensive and disruptive of current organized activity to be given serious consideration. Suppose the scenario has the enemy destroying a large portion of our land-based retaliatory forces in a surprise attack, and that the bulk of our remaining fixed, mobile, and manned forces are expended in a retaliatory blow. Only a small portion of his offensive forces remains. If the tattered remnants of each society have not yet agreed on a truce, it might be argued that shelters for the survivors would strengthen our hand in negotiating such a truce. But the same evidence that obtains in a prenuclear exchange period applies here. If he wants to threaten our urban survivors, the fallout shelters can hardly be expected to impress; they are too vulnerable. Thus, evacuation of the survivors is the only alternative, and this will have been done already, in the aftermath of the opening exchange, merely to get people into the less contaminated areas of the country. It would seem, then, that as a preattack or as a postattack deterrent of blackmail, or as a preattack deterrent of a direct assault, fallout shelters are of extraordinarily little value.

Soviet responses to civil defense

Thus, the major case for either the shelter or the evacuation program is primarily in terms of saving lives if we do get into strategic nuclear war, Civil defense could reduce the disutility to us of a nuclear exchange. But what of the probability of that exchange ever taking place? Would a shelter or evacuation program modify that dimension of the probability-utility calculus? It has already been suggested that as a deterrent, civil defense has almost nothing to offer as a device for reducing the probability of nuclear attack. Now let us ask whether civil defense might exercise any impact in the opposite direction: raising that probability.

What sorts of American intentions and expectations would the projected shelter program symbolize to the U.S.S.R.? At the very least, it would suggest that we have markedly raised our own estimate of the probability of strategic nuclear war, and are therefore hoping to minimize its destructiveness. Now if the adversary becomes convinced that we think such a war is more likely, he will probably react in one or both of the following fashions: First, he could assume that we are giving more serious consideration to an opening blow ourselves; he could attribute this propensity to our fear of falling behind in the space race, or in the struggle for dominacy among the nonalined nations, or in the overall power struggle, and assume that we plan to resote our original advantage by getting in that very valuable first blow. Or he could assume that we are more convinced that he is planning a surprise attack and are preparing against it. In either case, it would be legitimate for him to give greater consideration to opting for that very opening strike himself, either in order to preempt our attack, or to preempt what looks like our preemption of his surprise attack.

If one adds to these general Soviet responses to a U.S. shelter program some more specific considerations, the picture takes on an even more ominous hue. For example, the Kremlin strategists might well want to ask how useful a shelter program would be to the nation whose doctrine is a purely retaliatory one. More specifically, how many lives would be saved by such a program if we were the victims of a surprise attack? If the attack were against our cities, it is evident that very few people would be able to get to their shelters in time, and those that did would not find them particularly protective. And in the more likely event that the attack was against military installations, there would still be, as Admiral Burke testified last year, "the improbability of having enough warning time for the major portion of our population to attain shelter." But in this event, those

who did manage to get to shelters would be provided with a modicum of safety against radioactivity.

The significance of warning time is extremely crucial. If the lapse between identification of an attack and time of impact in a great many urban areas is shorter than that required to move thousands of people from exposed office, factory, and shopping sites to their shelters, these shelters are relatively useless to the victim of an opening attack. If shelters are installed both at place of work and residence, minutes of warning time could be materially reduced, but would husbands and fathers willingly remain away from their families during such a catastrophe? Many of those who, in the absence of coercion, headed for home, would die or be incapacitated en route.

If the shelter-seeking time is greater than the warning time, then the Soviets must begin to wonder whether the shelters are for protection against surprise attack, or whether they may not reflect a first strike strategy. Inasmuch as shelters could be much more useful if there were several hours warning time, it would be reasonable for the U.S.S.R. to assume that they will be used to protect civilians from the effects of a retaliatory strike. And if the adversary is led closer to such an inference by our shelter program, he will be accordingly and increasingly lured into opting for the first strike himself.

Execution of evacuation measures might well be even more provocative. As sharp as the distinction between first and second strike usefulness of shelters may be, that between these two choices under an evacuation program is greater still. We could never hope to carry out a successful evacuation of our major cities under a surprise attack, but between the launching of our own attack and the impact of a retaliatory blow, the great bulk of our urban population could be readily dispersed.

These, then, are some of the inferences which a hostile and fearful enemy could readily draw from an American civil defense program. They are not the only and inevitable inferences, but they are probable enough to give us pause, given the tragic consequences to which they might lead.

Civil defense in the Soviet Union

One final element in our consideration of civil defense and stable deterrence is whether or not the Soviet Union has undertaken such a program. Many shelter and evacuation advocates base their case on the existence of a "substantial" program on the part of the potential enemy. It seems essential to challenge the veiled allusions and knowing insinuations which pass for evidence of such a program.

First off, let us reiterate that the U.S.S.R. has less need of a shelter or evacuation program than do we, given the markedly different population densities and industrial concentrations. There seems little doubt that there is a farflung program of training for civil defense; General Tolstikov claims that an earlier course ending in 1956 was attended and passed by 85.5 percent of the population. The efficacy and relevance of such training programs is open to very serious question, and if, as a recent Rand Corp. witness told a congressional subcommittee, they are spending up to $1.5 billion a year on the program, the U.S.S.R. counterpart to Senator Young would really have a case.

As to shelters, the World War II ones were converted into offices and classrooms in 1947, with reinforcements and sandbags removed and windows installed. The most recent available instruction manual indicates that they will retain their nondefense function until the alert is sounded, at which time "all shelters used for cultural or practical needs are immediately cleared and are prepared for their primary purpose." According to a number of newspaper reporters, there is no sign of any fallout shelter beyond that provided by the subways of Moscow, Leningrad, and Kiev, each of which could possibly provide for about 20 percent of the city's population. It is interesting to note that the Rand witness also stated that the Moscow subways could shelter 2 million people, whereas a Library of Congress study calculates that, at 20 square feet per capita (the U.S. long-stay estimate) they could only handle 375,000. Dividing the 7,500,000 square feet of track and station by 2 million indicates 3.75 square feet per capita; apparently the sturdy Muscovites are capable of standing (sitting would require 6 square feet) in the same position, motionless, for 2 weeks or so, while engaging in all of those basic processes essential to human survival.

In a recent report on the extent of Soviet civil defense planning, Osgood Caruthers of the New York Times found that "nowhere in Moscow or any other city visited by foreigners can one find signs pointing to shelters * * * no practice alerts are held * * * posters * * * are extremely rare * * * [and there is] no such thing as an effort on a citywide basis to organize block crews or house ward-

ens for civil defense." Referring to alleged secret information on civil defense in the U.S.S.R., Caruthers concludes, "nothing that can be seen, heard, or read here in Moscow gives even a hint of support for such reports," and "foreign military experts assigned to embassies in Moscow say that in extensive travels around the Soviet Union they have seen little or no evidence of any construction work on shelters * * *." In summary, most of the evidence suggests that Soviet civil defense efforts have been little more successful than those of the United States in getting shelter and evacuation programs off the ground. If there is any genuine evidence to the contrary, it has not yet been made available.

Will it really benefit us?

If the major argument to be adduced in favor of a civil defense program is that the adversary is doing it, we will want a lot more data before accepting these allegations as facts. Even if we were reasonably certain that the Soviet Union is going into a shelter and/or evacuation program, it does not necessarily follow that we have no choice but to emulate them. Our concern must be with a rational security policy, not a blind aping of the adversary, and if our own sober analysis indicates that civil defense may increase this possibility of the war we seek to prevent, there would be little wisdom in responding in the conventional, reflexive manner.

Our embrace of civil defense could have a markedly deleterious effect on our entire national approach to the war-peace problem. On the one hand, it would probably generate a sense of complacency and false security, leading to the assumption that strategic nuclear war might not be so disastrous after all, and, in turn, could lead to reduced vigilance in our deterrent posture, perhaps even encouraging Soviet adventurism. On the other hand, and more likely, it could also tend to generate a sense of inevitability regarding war. Obviously, the citizenry would reason, "they" wouldn't have us building shelters and practicing evacuation unless they thought that war was pretty likely, and if they think it is, it must be. Anything that increases the sense of fatalism regarding an ultimate military showdown will inexorably diminish the initiative and imaginativeness of our search for alternatives, and since creativeness has certainly not characterized our search for peace with honor in the past, we can hardly afford to relax these efforts now.

In summary, it would seem that a civil defense program would enhance neither our deterrent against direct attack nor against nuclear diplomatic blackmail. Instead, shelters and evacuation plans are likely to generate precisely those expectations in the U.S.S.R. that will markedly increase their propensity to strike first. Moreover, they may well symbolize (and become) for America the end of any serious search for nonmilitary alternatives to international conflict.

Given the hordes of physical scientists, social scientists, and operations analysts now moving in and out of Washington, and the deep affection most of these intellectuals have for a strategy called stable deterrence, it is ironical that the administration could have proposed a program so destructive of the little stability that there is in the present standoff. Never has our sophistication in military strategy been greater, and seldom has it been brought to bear so negligibly. The particular irony is that civil defense is being opposed by those who understand the problem least: the tight-fisted economizers and the Red-hating jingoists. That civil defense has not been presented and debated in terms of its effects on stable deterrence is further evidence that America is still a long way from a coherent synthesis in its national security policy.

Courthouse and Federal Office Building, Billings, Mont.

WITNESS

WILLARD E. FRASER, BILLINGS, MONT.

Mr. Thomas. The next statement will be from Mr. Willard E. Fraser in relation to the public building project at Billings, Mont.

Mr. Fraser. Mr. Chairman, and honorable members of the committee, my name is Willard E. Fraser. I am a resident, building owner, and businessman of Billings, Mont. I am speaking for myself, as well as other building owners. Before proceeding with the following statement, I wish to thank this committee for the

opportunity of presenting and entering into the record, the following statement.

Abraham Lincoln has been given the credit for the statement, that in effect says, "The Government should only do that which the people, acting singly, cannot do for themselves." This statement, in varying form, has been often quoted, and affirmed by political leaders of both parties, with the added thought that, "Government should not do that which the people can do for themselves."

Because the businessmen of Billings, Mont., have provided all the needed office space, at reasonable rentals, that the varying agencies of the Government require in Billings, I am appearing before your committee to protest any appropriation for the construction of a proposed Federal office building for Billings, Mont., and that the construction of such a building would violate the principle stated above, as well as sound economics, I submit the following:

When the Government expanded its activities, and moved into Billings, Mont., following World War II, it called upon local businessmen, of whom I am one, to supply it under competitive bid, with needed office space. Several buildings were then built specifically for those agencies that have since continued to occupy them, and when additional space has been required, it, too, has been promptly supplied. (On a recent call for space, 11 bidders offered to provide same.) The Government designed, and planned all the interiors of these buildings, and in every way these were constructed to meet Government's needs. All of these buildings are modern—including air conditioning—in every way, and a determined effort has been made in Billings to anticipate and meet Government space requirements. Only recently, a new building was built expressly for the Forest Service, and I, only 3 years ago, added an addition to my building that cost upward of $175,000. We were willing to do this, as we were repeatedly told by GSA agents that as Billings' building owners had so thoroughly, efficiently, and economically met all Government office needs that it would be impossible to economically justify a Federal office building in Billings, and that we need have no fear of same if we would continue to supply the space as we are now doing. This Billings building owners have done consistently.

That this proposed Federal building is economically unsound, consider the following:

$5, 981, 360. 00	is the rent the Government would pay at present rates if it continued to lease the space it now occupies over the next 40 years. (The figure "40 years" is used herein as the Government says it will take 40 years to amortize the proposed building.) This figure includes all janitorial supplies, services, and utilities.
6, 516, 000. 00	is the announced cost of the proposed Federal building.
5, 009, 180. 00	is the interest cost on $6,516,000 figured at the going rate of 3¾ percent, the present interest rate on Government bonds.
8, 000, 000. 00	is the cost of janitors, supplies, utilities, etc. the Government says it will take to operate the building for 40 years.
19, 525, 180. 00	is total cost of building and operating the proposed building for 40 years. Compare this to the $5,981,360 that it would cost if the Government continued to lease its present office space for 40 years.
19, 525, 180. 00	is total cost of Government-operated building over 40 years.
—5, 981, 360. 00	is total rental costs (at present rates) over 40 years.
13, 981, 760. 00	is additional 40-year costs if Government builds its own building.
13, 543, 760. 00	is the additional, unnecessary cost to the taxpayer if the Government builds the proposed Federal building over and above what it will cost if it continues to lease the present space occupied by the Government in Billings.
782, 356. 40	is the property tax present building owners would pay, at the present rates, over the next 40 years to Yellowstone County. In contrast, the proposed Federal building would not pay 1 cent in taxes to Yellowstone County, for the Government pays no taxes, and in addition, private building owners would be paying income, social security, and other taxes.

Clearly, the proposed Federal building would severely depress the economy of Billings and Montana and America in many ways. It would require the purchase of no supplies, such as cleaning materials, insurance, or toilet supplies for which present building owners now spend many thousands of dollars with Billings businessmen, for the Government buys no insurance, and ships in all supplies from a central Government warehouse.

These figures are obtained from the report of the GSA submitted to Congress on September 14, 1959, and a letter to Senator Mansfield dated March 15, 1960, and from subsequent GSA statements. There are many inaccuracies in these two reports, but two that come to mind are (1) an inference that none of the presently occupied buildings are air-conditioned. In fact, all the Government-occupied buildings in Billings are air-conditioned. (2) That the proposed building would house the post office. The Post Office Department has stated that the post office will remain in its present building, and I might add that only 2 to 3 years ago, two or three hundred thousands of dollars were spent in renovating that building. Is this good planning?

That no detailed study as to the need of, or effect the proposed Federal building would have on the Billings office rental economy is best expressed in the following quote from the U.S. News & World Report of August 28, 1961, which magazine did an article on this proposed building—"Cost Versus Policy"—GSA officials were asked about the cost to the taxpayers of the Federal office building in Billings, compared to the cost of leasing privately owned space. Said one, "Quite frankly, we don't compare costs. There has been no details comparison made in the Billings situation." This is obvious.

The same U.S. News & World Report quotes a banker as saying that "Billings has empty office space coming out of its ears." It also quotes Federal employees as being "happy in their present locations."

Actually, Billings is suffering from an oil boom that turned sour, during which several buildings were built, and which are now vacant, or partially so. It is reliably estimated that between 200,000 and 300,000 square feet of office space is presently available. To add to this already vacant space will do untold harm to the office rental situation in Billings. To name a few, Mobil Oil, Humble Oil Co., Consolidated Trucking Co., and the Kress Co. have just now moved large staffs, from, and are leaving empty space in Billings.

To concentrate some 1,000 Federal employees into one building in a small city, the size of Billings would have undesirable social effects on the community by tending to isolate Government employees from the rest of the community, and would hardly be good public relations for the Government; for many social problems will inevitably arise if all the Federal employees are segregated under one roof. Actually, the various bureaus have little, or nothing in common, and no efficiency could be obtained by so segregating them, as several bureau people have pointed out. The head of one of the bureaus in Billings recently stated, "It would make just as much, or more, sense to concentrate all the various churches of Billings—such as the Baptists, Catholics, Congregationalists, Jews, Methodists, Mormons, and Presbyterians, etc., all under one roof—and as conducive of harmonious operation."

It is true that rental rates might conceivably go up during the next 40 years, but they will only so do if building operation costs increase, and should this occur, the costs of operating a Federal building would likewise increase. The competitive system, under which the presently Government-occupied buildings were built, will continue to operate, and serve to keep rental rates at a minimum. Can the same be said for a Government-owned building? Can a capitalistic system continue to operate where there are no profits?

In conclusion: Any investigation will reveal that this project is quite unnecessary, and that a vast amount of vacant office space now exists in Billings. To add to the present vacancies, the seven office buildings now Government-occupied will bring chaos and hardship to the Billings rental market. An investigation will further show that Billings is already office building overbuilt. Due to our depressed economy, more space is being constantly thrown onto the market. Elsewhere, the Federal Government is proposing to spend tax dollars to raise depressed economies, yet here in Billings it is now proposing to spend tax dollars to further depress our economy.

The unrefutable fact that it is more economical for the GSA to lease space than to build and operate its own building in Billings is clearly shown herein. According to the GSA's own figures, if it continues to lease space needed in Billings over the next 40 years, the cost to the taxpayers will be slightly under $6 millions of dollars, but to build and operate its own building will cost the taxpayers upward of $20 million. Is this fiscal responsibility?

Because Billings building owners have already met, at very nominal rates, all Government's needs (buildings now Government-occupied were built expressly for the Government), and are on the tax rolls, because there is already ample space now available, because it is more economical for the GSA to lease than to build, and because of the chaos this project would bring to the Billings market, it is respectfully requested that no appropriation be allowed for this project at this time.

Respectfully submitted.

WILLARD E. FRASER.

Finally that the threat of the construction of the proposed Federal building adversely affects the economy is manifest in the fact that it is now impossible to finance construction of private office buildings here in Billings.

FEDERAL SUBSIDY FOR HELICOPTER CARRIERS

Mr. YATES. Mr. Chairman, I have some material concerning the subsidy of helicopter carriers pertaining to the appropriation "Payments to air carriers, Civil Aeronautic Board," which I submit for the record at this point. Included is a statement on revenues of Chicago Helicopter Airways, Inc., an example of requests for assistance received continually from various branches of the military and a report submitted to the Civil Aeronautics Board by the Vertical Lift Aircraft Council of the Aerospace Industries Association of America, entitled "Contributions of Certificated Helicopters to the National Defense."

(The material referred to follows:)

THE CONGRESS SHOULD APPROVE THE APPROPRIATION OF $5,850,000 BEING REQUESTED FOR THE HELICOPTER CARRIERS FOR THE FISCAL YEAR 1963

1. The appropriation of $5,850,000 for fiscal 1963 being requested by CAB is a reduction from the $6 million appropriated for fiscal 1962 for the three helicopter carriers.

2. Through a cooperative program between CAB and the helicopter carriers (requiring reductions in service and other measures), the carriers are not only "living within" the $6 million granted for fiscal 1962 but are programing reductions in subsidy for each of the years to follow.

3. A precise determination of how much the subsidy can be decreased each year must await actual experience with the new turbine helicopters, which will not go into service until later this year. However, the new ships are a great advance, which will reduce subsidy. The CAB Chairman recently stated that "The introduction into service of the turbine-powered, twin-engine helicopter is as near a true technological breakthrough as we have seen in recent years."

4. Thus, the helicopter appropriation for fiscal 1963 is needed to get these new ships into service, which will start the helicopter carriers on their way to self-sufficiency by a lessening each year of their dependence on the Government.

5. A denial at this time of any further aid for the helicopter carriers would have serious repercussions both at home and abroad.

6. The existing helicopter carriers would forthwith be put out of business and the Government would thereby fail to capitalize on its large investment in this industry, which was made in contemplation of the very event about to happen, i.e., the introduction of more economical helicopter equipment.

7. The three largest cities in the Nation (Chicago, Los Angeles, and New York) would be deprived of their helicopter service, just as they are about to "turn the corner" to a more economical and promising service.

8. At the very time that emphasis is being placed on civil defense, the three largest cities in the Nation would lose one of their most valuable civil defense "tools," i.e., their helicopter service.

9. The military helicopter operations of the Army, Navy, and Air Force would also suffer, by being deprived of the valuable experience they gain each year from the scheduled helicopter carriers, which has saved millions for the military.

10. Internationally, the closedown of the three helicopter carriers (due to a congressional refusal to provide further support), would lose this country its

world leadership in the helicopter field. Other nations which buy U.S.-made helicopters for their own airlines, would hardly continue to do so if the U.S. Congress were to pass a vote of "no confidence" in our own product, by killing off our existing helicopter carriers before our own improved helicopters could ever be put into service.

11. Any notion that the existing U.S. helicopter carriers can survive without congressional aid, by having the trunk airlines step in and provide the needed support (once it is terminated by the Congress), is both unrealistic and ill timed. In view of the financial troubles which have beset the trunks, it is obvious that they would not aid the helicopter carriers in the foreseeable future, even if they might be willing to entertain the thought in better times.

12. It would be tragic for the Congress to spell the doom of the U.S. helicopter transport industry, based on the miscalculation that some way can be found for the industry to otherwise survive. One attempt now being made to operate small new turbine equipment in scheduled service without Government aid, is not meeting with financial success. At the outset and for a period of time thereafter, any scheduled operator of turbine helicopters must have help from the Government, just as other forms of transportation have had in the past during their developmental stage.

13. The helicopter is still a comparatively new vehicle, which is still in a developmental stage. Due to its great potentialities, it is a good investment for this Government to continue to support this most versatile vehicle we have ever had, until it reaches the maturity and capability required to take its full place in the commerce and industry of this Nation.

The Commercial Revenues of Chicago Helicopter Airways, Inc., Comprise Almost Half of Its Total Revenues

Although the helicopter traffic between Midway Airport and O'Hare Field in Chicago has lessened due to the decrease in airline schedules into Midway Airport, the commercial revenues of Chicago Helicopter Airways still comprise almost half of its total revenues from all sources.

In the calendar year 1961 (that ended only 6 weeks ago), the commercial revenues of the Chicago helicopter service constituted 45 percent of its total revenues, as shown by the following figures:

	Operating revenues in year ended Dec. 31, 1961	
	Amount	Percent of total
Passenger revenue	$1,430,294	45
Other commercial revenue	2,423	
U.S. mail	1,775,976	55
Total	3,208,693	100

The 45 percent ratio for the Chicago helicopter service (which has been carrying passengers for only 5 years) compares favorably with the local service industry (which has been carrying passengers for many more years).

In the year ended September 30, 1961 (the latest year for which industry figures are presently available), the 13 local carriers as a group derived 62 percent of their total revenues from commercial sources. This is only 17 percentage points better than Chicago's 45 percent, which was achieved in a much shorter period of time.

HEADQUARTERS, U.S. ARMY TRANSPORTATION MATERIEL COMMAND,
St. Louis, Mo., February 9, 1962.

CHICAGO HELICOPTER AIRWAYS,
Chicago Midway Airport,
Chicago, Ill.
(Attention chief engineer).

GENTLEMEN: The H–34 project engineering office is evaluating improvements proposed by Sikorsky on the hydromechanical clutch for the S–58 helicopter.

The improvements are for the purpose of permitting more reliable clutch operation and also to prevent excessive oil leakage. These improvements call for the following essential changes to the clutch:

(*a*) Clamp the outer races of the dual bearing.
(*b*) Omit the needle bearing at the governor end.
(*c*) Adding "0" rings for better internal oil seals.
(*d*) Using carbon seals on outer bearings for better external oil seal.
(*e*) Larger spacer on the flange coupling.

The Sikorsky representatives have informed this office that you have about 10 helicopters with some of these changes. They further said that you have had good success with the new arrangement.

Since nothing takes the place of field experience in evaluating proposed changes, this office would sincerely appreciate a letter indicating what changes you have made in your clutch, how many helicopters have the revised clutch, some indication of the extent of improvements that resulted from the changes, and any other information that would be of value.

Sincerely yours,

ELMER J. BANNICK,
H–34 Project Engineer, Directorate of Engineering.

CONTRIBUTIONS OF CERTIFICATED HELICOPTER OPERATORS TO THE NATIONAL DEFENSE

Submitted to the Civil Aeronautics Board by the Vertical Lift Aircraft Council of the Aerospace Industries Association of America, Inc., Washington, D.C.

In testimony before the subcommittee of the Senate Committee on Appropriations during hearings on the Independent Offices Appropriations Act last June, Mr. Alan S. Boyd, Chairman of the Civil Aeronautics Board stated, in response to a question by Senator Warren G. Magnuson (chairman of the subcommittee) that one of the specific purposes the three helicopter carriers were certificated for was "to assist in the development of rotary-wing aircraft for national defense purposes." (Hearings on H.R. 7445, 1st sess., 87th Cong., p. 121.)

The purpose of this memorandum is to set forth some of the specific ways in which the certificated helicopter operators (in Chicago, Los Angeles, and New York) have in fact assisted the Department of Defense in improving helicopters used by the armed services; in enabling the armed services to take advantage of cost savings as a result of service experience gained by the scheduled helicopter air carriers; in extending major component overhaul lives; in substituting for an accelerated test program; in developing operating techniques and training programs; in establishing parts usage for provisioning and budgetary purposes; in providing direct training, direct data, and direct product improvement assistance, and in a number of other ways, both direct and indirect, the most important of which are set forth below.

By making contributions to the military services, the three certificated helicopter operators have enabled the military to realize substantial dollar savings. While it may be possible to construct "estimates" of such dollar amounts with regard to certain kinds of benefits directly attributable to the improved knowledge and techniques that flow from the experience of the scheduled helicopter operators, the real significance of the cumulative contribution by the certificated helicopter operators to the military service lies in the fact that such savings are a substantial factor in relation to the total estimated subsidy requirement of the helicopter carriers in their present stage of development. That the matter cannot be presented with mathematical certainty should not detract from the more important fact that the cumulative contribution has been significant, and that it has enabled the military services to achieve substantial dollar savings.

The reason that the cumulative contribution of the certificated helicopter air carriers and the resultant dollar saving to the military services has become more and more significant in the past few years is that the military services, and particularly the Army, have substantially increased the size of their helicopter inventories. The total number of helicopters presently in the active inventory of all U.S. military services is approximately 4,000.

Furthermore, recent military procurement actions and statements by responsible military spokesmen indicate that the military potential of rotary-wing aircraft is only beginning to be realized, and that the helicopter will continue to fill a vital role in military applications for many years, because of its flexibility and versatility.

A recent example of the helicopter's unique capability insofar as limited war is concerned, was the dispatch of several companies of U.S. Army helicopters to south Vietnam. A further illustration of recent trends which indicate greater and greater reliance by the military services upon the helicopter is the statement by a spokesman for the Army that by 1970 the Army expects that three out of every four, or 75 percent, of the aircraft in its active inventory will be helicopters or other vertical-lift types.

The size of the current military helicopter inventory and the trend referred to above of increased dependence by the military services upon the helicopter for a steadily expanding variety of military missions are relevant to this discussion of contributions to the military by certificated helicopter operators, because most of the helicopters operated by the three certificated operators are commercial models of helicopters originally developed for the military. This overlapping is natural, since the objectives of the military services to secure more dependable and economical helicopters with good performance characteristics are similar to those of any certificated helicopter air carrier.

The specific examples of contributions to the military by certificated helicopter operators that follow support the general thesis that use of the same or similar model helicopters by the certificated carriers is of great benefit to the military services by helping them to expedite the mechanical maturity of each new rotorcraft. Furthermore, since the intensity of utilization by the scheduled operators exceeds by far that which is obtainable by military service units under training programs, and can be more completely controlled, documented and analyzed, the cumulative experience of the certificated operators with different types and models of helicopters has been particularly effective in solving some of the current state-of-the-art problems of the helicopter. This does not mean, however, that mechanical improvements in military model helicopters are not made during their intensive military service. Many are. But what must be recognized is that in this case, as in many others, the most intensive progress is made under the impetus of commercial competition where economy and efficiency are factors assigned the highest priority—particularly where, as here, such operations are reviewed in exhaustive detail by the Air Carrier Branch of the Federal Aviation Agency and by the Civil Aeronautics Board.

It should be pointed out that since the military services, in most of the specific examples set forth below, were notified directly by the manufacturer of the design improvement, the corrective action or the recommended increase in service tours, the fact that the contribution was originally made by a certificated operator is not generally known. In most instances, such information from the carriers is channeled through the manufacturer's technical representative, to the manufacturer, where it is analyzed and often tested by engineering personnel. If necessary, inspection trips to the certificated carrier's operation may be made. The corrective action, or the recommendation for a change or improvement, is then prepared, and the military services and other users of similar equipment are notified by the manufacturer.

One additional general point should be made. That is, that the dynamic components and controls of the helicopter—which comprise approximately 70 percent of the development cost—differ greatly from the fixed-wing airplane and must be considered more nearly parallel to powerplant installation. Hence operating costs may vary significantly as a function of overhaul periods and service lives of these components which, as with engines, can be increased only with service experience and associated product improvement.

As a result, a new model helicopter entering service must start with low overhaul periods which can only be extended through inspections of a number of aircraft after completion of the first service tour. Rapid buildup of flight time for these inspections is, therefore, the determining factor in the length of time required to substantiate parts and extend overhaul periods. During this buildup phase,

the operator must face reduced aircraft availability, higher maintenance costs and frequent component change and overhaul, and considerably increased rotating spares inventory. In view of these circumstances, it is apparent that the accelerated flight time accumulation afforded through scheduled operations and the optimum service life and overhaul periods developed thereby, result in substantial dollar savings to the military.

While, as indicated above, the precise dollar amount of this saving cannot be calculated with mathematical certainty, it is clear that the high aircraft utilization experience of the certificated helicopter carriers leads to extension of service life for components common to commercial and military use with significant resulting savings in inventory, less maintenance, lower operating costs, and increased combat effectiveness.

Available data indicates that the three certificated helicopter air carriers have consistently achieved a utilization rate at least 3 and 4 times greater than that achieved by the military services. For example, as of June 1, 1961, the 1,154 Sikorsky S–58-type aircraft in U.S. military service (Army, H34; Navy, HSS–1, HSS–1N, HUS–1A; Marines, HUS–1, and Coast Guard, HUS–1G) have accumulated 1,189,771 Fying hours for an average aircraft monthly utilization of less than 32 hours. None of these aircraft has passed 3,000 hours and only 10 have passed 2,000 hours. In sharp contrast to this military utilization is the utilization achieved by New York Airways and Chicago Helicopter Airways with a total of eight S–58 helicopters. These eight S–58 helicopters as of August 31, 1961, have accumulated a grand total of 39,670 hours with an average aircraft monthly utilization of 121 hours. Of the aircraft still in service with Chicago Helicopter Airways, three have passed 5,000 hours and three have in excess of 4,000 flight hours. Similar data for the Sikorsky S–55 helicopter show that 1,012 S–55 helicopters in military service achieved an average monthly utilization of less than 35 hours. The average aircraft monthly utilization achieved by the three certificated helicopter carriers, who operated a total of 13 S–55 helicopters, was 123 hours. The S–55 helicopters currently in service with Los Angeles Airways have an average flight time of 12,650 hours. (Data supplied by Sikorsky Aircraft.)

An even wider utilization gap exists in the case of Boeing-Vertol Model 44/H–21-type helicopters. For the 12-month period ending October 31, 1961, 290 U.S. Army H–21's achieved an average aircraft monthly utilization of 16.4 hours per month, while 90 U.S. Air Force H–21's achieved an average monthly utilization of 22.3 hours per aircraft. The five model 44 helicopters operated by New York Airways, the certificated helicopter operator in New York City, during this same 12-month period achieved an average monthly utilization of 139 hours per aircraft. The certificated operator's average utilization was, therefore, from 6 to 8 times higher than was the average military utilization of similar aircraft. (Data supplied by Boeing-Vertol.)

The utilization rate of Bell helicopters achieved by the certificated operators is similarly much higher than the utilization rate achieved by the military services. Of the more than 3,100 light helicopters Bell has produced, 1,610 have been delivered to the U.S. military services (Army, H–13; Navy, HTL/HUL; Coast Guard, HUL–1G; Air Force, H–13). To date this combined military fleet has accumulated approximately 3,236,100 flight hours for an average aircraft monthly utilization of approximately 25 hours. The high-time H–13-type military aircraft has 3,425 hours' flying time, and there are less than five still in service which have more than 3,000 hours' flight time. There are approximately 600 H–13's in the 2,000- to 3,000-hour bracket. By contrast, the commercial helicopter fleet has accumulated in excess of 6 million hours. Today's high-time commercial model has 11,200 hours' flying time. The second highest has 10,500 hours, and both of these machines are still in service. It is significant that 430 commercial model 47 aircraft have accumulated in excess of 3,000 hours, 75 of which have passed the 5,000-hour mark.

The certificated operator in Chicago has, in 13 years' experience with an average fleet of five Bell helicopters, accumulated a total of 66,600 hours, or 1,020 hours per year per aircraft. In total time, this represents 3,472,000 miles of operation. When compared to typical military service utilization of similar Bell equipment—which averages about 300 hours per year—it can readily be seen that because of its higher utilization, Chicago Helicopter Airways' average fleet of five Bell helicopters produced in 13 years the same amount of data and experience that would have taken five military Bell helicopters about 44 years to produce.

By the end of 1953, at which time the overhaul period increase from 300 to 600 hours took place,[1] the spread between military and commercial experience was even more dramatic. At that time, the average military model 47 had approximately 750 hours of flying time accumulated and the high-time aircraft had accumulated somewhat less than 1,500 hours. At that time there were 10 commercial helicopters which had surpassed 3,000 hours utilization. Of these 10, 6 belonged to Helicopter Air Service (predecessor of Chicago Helicopter Airways). These six had very well documented service and maintenance records and boasted flight times from 4,000 to 4,300 hours' accumulated time in the air. Before they were retired, four of these same six Bell–47's passed 6,000 hours, and they averaged 1,050 hours per year.

Examples of specific instances during the past few years where the high aircraft utilization of the three certificated helicopter carriers has resulted in extension of service life, extension of overhaul periods, and increases in service tours of major components common to certificated and military use are set forth below:

COMPONENT LIVES AND OVERHAUL PERIODS

1. Probably the most dramatic example of an increase in overhaul periods occurred during the Korean war. A large number of Bell helicopters became grounded in Korea due to expiration of the then-existing 300-hour overhaul period and the lack of spare parts to accomplish overhauls. Right in the midst of this serious dilemma the overhaul period was doubled from 300 to 600 hours on the basis of records and data which the manufacturer obtained from the certificated helicopter operator then using similar Bell equipment. The increase in overhaul inspection time was subsequently adopted by the Army, Air Force, Navy, Marines, and Coast Guard for their Bell H–13 and HTL series helicopters. Furthermore, the ungrounding of the Korean fleet materially aided continuance of the dramatic rescue evacuations being performed. These evacuations saved the lives of over 18,000 American soldiers, an accomplishment hard to evaluate in dollars and cents. (Data supplied by Chicago Helicopter Airways, Inc., and Bell.)

2. The initial retirement life on Sikorsky S–55 main rotor blades was 1,000 hours. As a result of the service experience of the certificated helicopter operators and their rapid accumulation of flight time, which enabled them to supply main rotor blades to the manufacturer for laboratory tests which had reached the initial retirement life, the authorized retirement life of main rotor blades was increased to 6,000 hours. (Data supplied by Sikorsky.)

3. An engine vane assembly in the cooling air intake system of the Sikorsky S–58 helicopter had its life increased from 200 hours to "unlimited status" because initial weaknesses were discovered and corrected following utilization of the first commercial models of this aircraft. (Data supplied by Sikorsky.)

4. Two critical parts of the main rotor head originally made of magnesium on the Sikorsky S–58 helicopter were changed to aluminum at the insistence of the certificated operators. As a result, these components enjoyed a retirement life increase from 750 to 2,200 hours. In addition to the cost savings which accrued to the military services as a result of this change, many military aircraft enjoyed fewer corrosion problems in later production models of this helicopter. (Data supplied by Sikorsky.)

5. Extension of the overhaul periods of major components of both S–55 and S–58 model helicopters were made possible primarily because of the rapid accumulation of flight time and service experience on S–55 and S–58 aircraft components, by the certificated carriers. As overhaul periods were extended, maintenance costs were decreased, both for the certificated operators themselves, and for all the military users of similar equipment. An indication of the value of this certificated operator service experience to the military insofar as substantially longer overhaul periods alone are concerned can be readily seen from the first four charts attached to this memorandum (attachments 1 through 4). They show, respectively, the overhaul periods of the main rotor assembly and main transmission of the S–55 and the S–58. (Data supplied by Sikorsky.)

6. The rate of service tour increases realized by the certificated operators is considerably faster than that achieved by the military services where there is no equivalent certificated operation with similar equipment. The service tour increases on military Boeing-Vertol H–21 rotor hubs were quite slow when compared to the rate of service tour increase realized by the certificated operators with the Boeing-Vertol model 44. In the case of the former, no increase in rotor hub service tours was achieved prior to the fifth year of operation. By contrast, the military service tours increased from 450 to 1,200 hours within 3 years follow-

[1] See par. (1) under section on component lives and overhaul periods.

ing the start of certificated operations. These increases were substantiated almost entirely on the results of overhaul inspections on components of the certificated operators. Attachments five and six graphically portray the service tour progression for both the H–21/model 44 rotor hub and rotor transmission, respectively. (Data supplied by Boeing-Vertol.)

7. The certificated operators suggested a redesign of the Sikorsky S–58 throttle and mixture control system which made possible a 66-percent reduction in parts. This redesign also eliminated a maintenance nuisance. (Data submitted by Sikorsky.)

8. Service experience on the Sikorsky S–58 tail rotor gear box enabled the manufacturer to more than treble the overhaul period from 300 hours to 1,000 hours. This change was based on the overhaul of 485 tail rotor gear boxes by the manufacturer. Of these, 457 were from military aircraft having an average flight time of 275 hours per box. By contrast, the 28 tail rotor gear boxes from certificated carrier aircraft which were overhauled during the same period had an average flight time of 1,270 hours with some as high as 2,300 hours. It is clear, therefore, that the extension of the overhaul period from 300 hours—which was still in excess of the average flight time achieved on military aircraft—to 1,000 hours, was based solely on the experience of the aircraft which had achieved much higher utilization rates in certificated operations. (Data supplied by Sikorsky.)

PRODUCT IMPROVEMENT

The higher utilization achieved by the certificated operator also results in rapid operational verification of helicopter improvements. Examples of such improvements are as follows:

1. Initial models of the Sikorsky S–58 helicopter were delivered to both military and certificated users with a 48-blade fan. Repeated suggestions by the certificated operators to improve cold weather operation experienced with the 48-blade fan and to improve efficiency led the manufacturer to design a 24-blade fan which not only improved performance and still cooled adequately in hot climates but also weighed 17 pounds less than the 48-blade fan. (Data supplied by Sikorsky.)

2. Three major and several minor airframe modifications on the Sikorsky S–55 helicopter were developed and incorporated in military production aircraft as a result of operational experience by certificated carriers. The close surveillance and rapid time accumulation achieved by the certificated carriers made it apparent after only a short period of time that certain areas of the airframe were in need of reinforcement. As a result of these modifications subsequent military production aircraft were substantially improved. (Data supplied by Sikorsky.)

3. Following the first few years of production of the Sikorsky S–55 helicopter, some military users switched from a needle bearing main rotor head to a Timken bearing main rotor head. It was contemplated that this change would be incorporated in all military production models of this aircraft. However, as a result of extremely favorable service experience achieved by the certificated operators with the needle bearing rotor head, the military decision to switch to a Timken bearing was reversed and military users have since benefited from the use of needle bearing rotor heads in subsequent production models of this helicopter. (Data supplied by Sikorsky.)

4. Certificated operators discovered, during a modification program, that the nose wheel on the Sikorsky S–55 was in need of reinforcement. This change was made, proven successful, and later incorporated on all military production models of this aircraft. (Data supplied by Sikorsky.)

5. Military users of Boeing-Vertol H–21 helicopter were able to eliminate many interim fixes and promptly incorporate a final fix on the H–21 clutch actuator as a result of rapid operational verification by New York Airways, the certificated operator of Boeing-Vertol model 44 helicopter. Both the military and the certificated operator were experiencing a clutch actuator problem in that the clutch actuator was subject to failures after approximately 100 hours of operation. For the military users, whose average H–21 utilization was about 30 hours per month, this meant they could rely on the clutch actuator for about 3 months. The certificated operator, however, could not tolerate this problem because due to higher utilization (about 150 hours per month) it resulted in a failure approximately every 3 weeks. An accelerated improvement program with the actuator manufacturer was initiated, and improvements were quickly verified by the certificated operator. As a result, a completely reliable clutch

actuator unit has been developed which is now in use on both commercial and military helicopters. Attachment 7 shows the mean time between clutch actuator failure versus the calendar time for the H–21 and model 44 helicopter. (Data supplied by Boeing-Vertol.)

6. Similarly, the high utilization achieved by the certificated operator of Boeing-Vertol model 44 helicopters enabled the manufacturer to determine the need for further improvement in the clutch coupling in approximately one-fifth time that would have been required had the military alone been confronted with the problem. In this case, the original 24-tooth clutch couplings were experiencing tooth failure. A number of improvements were made, including shotpeening of the couplings. The certificated operator, upon evaluation, found these improvements to be inadequate. Accordingly, mandatory replacement of the 24-tooth couplings was established at 100 hours. Subsequently 12-tooth couplings were developed and installed in helicopters assigned to a TATSA accelerated test program.[2] Following the results of these tests, the new 12-tooth couplings were authorized for certificated and military operations. Without the accelerated operational experience by the certificated operator in the first instance—which led to the development of the new 12-tooth couplings—the solution to this problem would very likely have been delayed for many months with the possible loss of a number of aircraft. (Data supplied by Boeing-Vertol.)

7. A Bell helicopter tail-boom corrosion problem encountered by the Navy was solved by using components and records from a certificated operator. This enabled the Navy to take corrective action with respect to their HTL helicopter. (Data supplied by Chicago Helicopter Airways and by Bell.)

8. Equipment improvements developed by the certificated operator in Chicago and subsequently incorporated into Bell helicopters include a much improved ignition harness, a skid-type landing gear replacing wheel-type gear, and a winter cowling kit which increases safety and engine life in cool weather operations. (Data supplied by Chicago Helicopter Airways and by Bell.)

9. The extensive operating cost data compiled by a certificated operator verified to the manufacturer complaints from military users regarding engine maintenance cost. As a result of the documented statistical information received from a certificated operator the manufacturer decided to use an alternate powerplant for that model Bell helicopter, thereby substantially reducing engine maintenance costs. (Data supplied by Bell.)

10. New York Airways developed a type of emergency flotation gear for its Boeing-Vertol model 44 helicopters which permits a safe landing on the water and recovery of the helicopter intact without damage. In contrast, the type of flotation gear originally used by the military on its H–21 model helicopters was designed only to keep the helicopter afloat long enough to enable its crew and passengers to get clear. The New York Airways-type flotation gear is now used on military H–21 aircraft. (Data supplied by Boeing-Vertol.)

11. Although the initial design funding for Boeing-Vertol model 44/H–21 metal rotor blades was made available by the military, these blades received their first extended use by commercial operators. A number of discrepancies which showed up only after fairly extensive operation were noted by the certificated operators in time for corrective action to be taken prior to military utilization of the metal blades. (Data supplied by Boeing-Vertol.)

12. A number of internal modifications to the R1820–103 powerplant, which is used on Boeing-Vertol model 44/H–21 helicopters, were necessary to improve its reliability. These modifications were made possible only after a concerted effort by the engine manufacturer, the airframe contractor, and the certificated helicopter operator. The final recommended modifications were proven in certificated operations and incorporated in subsequent military models of the same aircraft. (Data supplied by Boeing-Vertol.)

[2] The value of an accelerated test program such as the Army's TATSA (transportation aircraft test and support activity) is unquestioned, particularly in cases where no commercial application of the helicopter model is anticipated. However, when commercial application is available, substantial savings can be realized because TATSA-type programs involve the expense of maintaining a military base together with the necessary personnel. This cost represents a direct burden on the overall value received from reduced spares requirements, product improvement, etc. Furthermore, a commercial program more truly indicates the capability of the aircraft insofar as number of engine starts and stops, number of takeoffs and landings per hour, number of flights at maximum gross weight, and the percentage of full power operation are concerned. An additional advantage of the certificated operation is that it is not limited to a given period of test, as are the TATSA programs. A certificated carrier's operation is a continual process, so that data development never ceases. (Data supplied by Boeing-Vertol.)

TRAINING, OPERATIONS, TESTING, AND MANPOWER POOL

In addition to the contributions to the military services by the certificated operators in increasing the retirement lives of various helicopter parts, extending the overhaul periods of major components and serving as the catalyst for product improvement, the certificated operators also make substantial contributions to the national defense in the following areas:

1. The certificated carriers have on a number of occasions participated with the military in providing training for military personnel. In addition to scheduled flight operations these trainees are acquainted with other aspects of helicopter service such as traffic management, accounting procedures, ground handling methods, helicopter maintenance, and other aspects of helicopter operations. During these training visits the trainees review maintenance and overhaul manuals, forms and procedures, flight operating techniques and procedures, periodic inspection requirements, parts, and inventory replacement and retirement programs, and service lives on equipment and components. (Data supplied by Chicago Helicopter Airways, New York Airways, Bell, and Sikorsky.)

2. The certificated operators have on occasion assisted the military in testing equipment and in giving opinions on equipment modifications. In addition, military helicopter engines incorporating modifications and improvements have been left with a certificated carrier for service and testing under the rigorous requirements of regularly scheduled operations. (Data supplied by Chicago Helicopter Airways and by Bell.)

3. Data received by the military from the certificated operators has assisted the military in forecasting its budgetary needs for equipment procurement and in determining its own overhaul cycles. Maintenance time studies prepared by certificated operators have been used by the military in determining the number of people required in military organizations to perform these jobs. (Data supplied by Chicago Helicopter Airways, New York Airways, Bell, and Sikorsky.)

4. The completely closed and completely documented operations of the three certificated carriers provide the military with a ready and superior source of technical and operating data undiluted by the extremely widespread and highly dispersed helicopter operations so often necessary in military experience. The certificated operators, particularly under the extreme and varied climates of New York and Chicago, have provided the military with valuable weather experience not afforded elsewhere. In Chicago, for example, the certificated carrier provided the military with information gained in operating helicopters in the cold weather and high wind conditions prevailing in the Chicago area. The Chicago operator's low weather minimums established conclusively that low flying can safely be conducted with the two-bladed semirigid rotor system due to its safe autorotation characteristics. Operations by the certificated carriers under light icing conditions have provided design and operating information on blade icing with the two-bladed rotor system which is of vital interest to the military. The certificated operator in Chicago gained experience in operating in high wind conditions up to 50 and 60 miles per hour which is also the maximum wind condition in which helicopters can land and take off from U.S. Navy aircraft carriers. This experience was beneficial to the Navy. (Data supplied by Chicago Helicopter Airways, Bell, and Sikorsky.)

5. Other significant data which have been passed on to the military by the certificated carriers include the development of flight training and efficiency programs, emergency flight procedures, test flight procedures, and night flying procedures, including cockpit lighting and flare installations. (Data supplied by New York Airways and by Sikorsky.)

6. The operations of the three certificated helicopter carriers have built up a significant nucleus of highly trained personnel, together with the equipment they operate and maintain, which constitute a valuable reserve for defense.

PROJECT HORIZON ENDORSEMENT

The foregoing adequately demonstrates that the operations of the three certificated carriers have been of substantial advantage to the national defense. The operation of commercial helicopters on a scheduled basis has been of important assistance to the military services, both directly and indirectly. In the words of the report of the presidentially appointed Task Force on National Aviation Goals (popularly referred to as (Project Horizon) in September 1961, "valuable experience is being gained in the technical and operational problems of maintaining regular scheduled services at relatively high utilization rates. *This experience is of particular interest to the military agencies* actively engaged in the development

of V/STOL aircraft * * * (and) should be continued where it has been certificated." [Emphasis supplied.]

VETERANS' ADMINISTRATION APPROPRIATIONS

Mr. THOMAS. Next we have a statement from the American Legion by Mr. John J. Corcoran, director of the National Rehabilitation Commission of The American Legion concerning funds for the Veterans' Administration, which we will place in the record.

(The statement referred to follows:)

THE AMERICAN LEGION,
REHABILITATION COMMISSION,
Washington, D.C., March 19, 1962.

Hon. ALBERT THOMAS,
Chairman, Subcommittee on Independent Offices,
Committee on Appropriations, House of Representatives, Washington, D.C.

DEAR MR. THOMAS: Thank you for providing this opportunity to present to the Subcommittee on Independent Offices the comments of The American Legion on the Veterans' Administration appropriations requests for fiscal year 1963.

We have reviewed the documents published by the Government which describe the proposed VA budget for fiscal 1963. In addition, the Committee on Veterans' Affairs has made available a blue sheet which sets forth the estimates submitted to VA central office by the operating services, the VA estimate submitted to the Bureau of the Budget, and the Budget estimate as submitted to the Congress. As usual, the final budget estimate is lower, in several categories, than the estimates of the operating services and the Veterans' Administration central office. We urge the subcommittee to make certain that sufficient funds are provided to insure that the Veterans' Administration will fulfill the mission that the Congress has assigned; that is, service to veterans and their dependents.

We have four current resolutions that we would like to bring to the attention of the subcommittee. They are—

Resolution No. 107, 1960 national convention: Support an adequate salary structure for the VA Department of Medicine and Surgery.

Resolution No. 24, May 1961 national executive committee: Seek adequate VA hospital facilities.

Resolution No. 141, 1961 national convention: Seek sufficient funds to permit the orderly and continuous operation of VA medical facilities at maximum capacity, and seek sufficient funds to carry out the pre- and post-hospital care program.

Resolution No. 427, 1961 national convention: Seek sufficient funds to provide special facilities for the care of the chronically ill and aged veteran.

May I express the appreciation of The American Legion for the considerate attention that this subcommittee has paid to the needs of the war veterans of this Nation. We thank you for the time and effort you devote toward determining the appropriations to be provided the Veterans' Administration.

I respectfully request that this letter be made a part of the record of the hearings.

Very truly yours,

JOHN J. CORCORAN, *Director.*

U.S. CIVIL SERVICE COMMISSION APPROPRIATIONS

Mr. THOMAS. The committee is in receipt of a statement from Mr. Clarence W. Bird, director, National Economic Commission of the American Legion, in connection with the appropriations for the Civil Service Commission. We will insert it in the record at this point.

(The statement follows:)

STATEMENT OF CLARENCE W. BIRD, DIRECTOR, NATIONAL ECONOMIC COMMISSION, THE AMERICAN LEGION, IN CONNECTION WITH FUNDS FOR THE U.S. CIVIL SERVICE COMMISSION, FISCAL YEAR 1963

Mr. Chairman and members of the subcommittee, the American Legion is vitally interested in better Government and in seeing that the Civil Service Commission is supplied with sufficient funds to carry out this objective, and that the preference granted veterans by Congress as contained in the provisions of the Veterans' Preference Act of 1944, as amended, are effectively administered and enforced in all respects.

Similarly, we feel that the protection of the merit system in Federal employment, based upon open competition for appointment to Federal positions, should be of primary concern to this subcommittee and the Congress. Unless the principles of open competition and merit for Federal appointments are adhered to and effectively enforced, preferential consideration to veterans in appointments is practically meaningless and we are convinced that Congress did not intend this to be so.

It follows, therefore, that the American Legion at its 1961 national convention adopted a resolution, No. 243, reading in part as follows:

"* * * In the interest of the welfare of veterans and the country as a whole, that we support the strengthening of Federal merit system operations; that we are firmly opposed to any weakening of the Commission's capacity to assist veterans through its veterans' program; that the Congress of the United States be encouraged to provide the U.S. Civil Service Commission the resources essential to meeting the ever-increasing scope and complexity of the Federal merit system."

The American Legion is of the opinion that we can be sure of obtaining and retaining top talent in the Government service only when we are confident that examining and appointing officials are fully trained and are complying with strict merit principles. Likewise, agency programs operating under delegated authority from the Civil Service Commission must be reviewed and effectively enforced to insure compliance with laws and best management practices.

Preferential consideration to veterans is an integral part of our Federal personnel system. This statement of public policy is set forth in the provisions of the Veterans' Preference Act of 1944, as amended. In essence this policy provides for first consideration of veterans with equal qualifications. Sections 12 and 14 of the act provide both for retention preference to veterans in the event of reduction-in-force and protection to veterans against arbitrary dismissal or arbitrary reduction in rank or compensation. Both sections permit appeals to the Civil Service Commission. In the appeals area we believe additional funds are necessary to assure that veterans will not suffer undue delay in seeking redress through the statutory right of appeal to the Commission, which is the only administrative remedy for the individual veteran whose rights are violated.

Section 14 of Executive Order 10988 provides that all employees in the competitive service shall be given identical appeal rights in adverse action cases initiated on or after July 1, 1962, as those provided preference eligibles under section 14 of the Veterans' Preference Act of 1944, as amended. The anticipated increase in adverse action appeals will bring to bear an extra burden upon the present appellate functions of the Civil Service Commission.

If the personnel and budget in the appeals area are not sufficient to meet the needs caused by section 14 of Executive Order 10988 and rapid changing employment conditions, it is bound to result in a curtailment of undue delay of appeal procedures as they now exist. The Civil Service Commission's obligation in connection herewith is classified under the "Regulatory, appellate, and advisory" function. The American Legion respectfully urges that adequate funds be made available for this purpose.

The responsibility for an effective veterans program has been assigned to the veterans service staff at the Commission's central office and the veterans Federal employment representatives at the Civil Service Commission's 10 regional offices.

The basic responsibility of this veterans service group is to provide the leadership to the Commission in order to insure proper and efficient administration of the provisions of the Veterans' Preference Act; to assist veterans in their employment problems to the end that Congress, Federal agencies, and the general public are assured that the Commission is properly carrying out the will of the people as expressed by Congress in that act, and to strengthen the relationship of the veterans program to the merit system.

With very limited funds and personnel the veterans service staff and the veterans Federal employment representatives are performing a very valuable

and necessary service. However, The American Legion feels that more funds and personnel are required to maintain an acceptable standard by this veterans service group. For instance, some of the veterans Federal employment representatives operating at the Commission's regional offices are charged with other increasing responsibilities not germane to veteran programs. These veterans representatives are under the jurisdiction of the Commission's regional directors. Therefore, we urge that adequate funds be made available to said directors in order that the veterans Federal employment representatives may be able to devote their full time to veterans' problems as was intended when these positions were originally established.

The recent buildup in military strength recalled many persons to military service including Federal employees. They will be returning to their preservice employment beginning this year and an increasing number will return in fiscal years 1963 and 1964. This veterans service group is responsible for assisting these ex-servicemen in getting back their jobs and in settling their cases. This will place an increased workload on this group and sufficient funds and personnel should be available for this purpose.

An examination of fiscal year 1963 budget submitted by the U.S. Civil Service Commission for "Salaries and expenses" reveals the requested sum of $22,190,000. The requested sum is a small increase over last year, and in our opinion, is the minimum required to accomplish the most essential program of the Commission.

The American Legion respectfully urges this subcommittee to approve the sum of $22,190,000 as requested by the Civil Service Commission, and express their interest that the spirit and intent of the Veterans' Preference Act of 1944 is effectively enforced. We submit these funds are necessary for the Commission's operations.

We appreciate this opportunity to present this statement before the subcommittee.

LIST OF WITNESSES

	Page
Alger, Hon. Bruce	895
Ames, M. B	406
Barton, Frank	304
Becker, G. F	925
Belsley, G. L	207
Bevilacqua, Dr. Edward	918
Bowman, R. W	331
Bretsch, H. P	326
Brewer, Carey	207
Brewton, C. S	207
Brunson, D. S	331
Buckley, E. C	406
Burns, J. J	1
Carlstrom, J. A	925
Cavers, Dr. D. F	947
Clewlow, C. W	398
Cook, Arthur	1
Cortright, E. M	406
Cosgrove, J. E	207
Dembling, P. G	406
Diaz, R. A	406
Dixon, T. F	406
Dryden, Dr. H. L	406
Durkee, W. P	1
Early, Miss R. E	925
Eberly, Rev. J. H	925
Finger, H. B	406
Fisher, L. C	331
Fitzsimons, Neal	1
Flory, W. E	374
Foley, E. P	304
Fraser, W. E	974
Gallagher, H. R	207, 284
George, G. C	374
Gottlieb, Dr. Sanford	935
Grey, S. T	331
Hagan, T. W	207
Hagen, Hon. Harlan	900
Hambleton, J. W	331
Harper, C. H	326
Hobart, F. P	374
Holmes, D. B	406
Holt, R. E	1
Howell, P. S	402
Hudson, V. S	390
Jaffe, Leonard	406
Joelson, Hon. C. S	901
Johnson, E. S	1
Kelley, Dr. A. J	406
Kendall, C. H	207
Kurzweg, Dr. H. H	406
Lilly, W. E	406
Manning, Charles	1
McConnell, J. W	1
McDermott, E. A	207
McDowell, Hon. H. B	902
McKinney, T. V	1

	Page
Merkin, W. I	304
Michael, Dr. D. N	929
Myers, B. C	406
Neely, Miss Frances	918
Newell, Dr. H. E	406
Nielson, O. H	304
O'Brien, J. J	374
Osmers, Hon. F. C	912
Pittman, S. L	1
Porterfield, Dr. J. D	331
Reed, R. S	285
Rice, W. B	207, 284
Ridgeway, James	1
Riley, G. D	955
Romm, Joseph	1
Ruder, William	304
Seamans, Dr. R. C	406
Shaw, Rev. W. R	944
Siepert, A. F	406
Silverstein, Dr. Abe	406
Snyder, Dean	331
Snyder, E. F	918
Solan, R. S	401
Stevenson, Frederic	1
Stewart, Irvin	207
Stewart, L. R	402
Stokley, R. W	207
Stoller, Morton	406
Stone, B. D	368
Strope, W. E	1
Tepper, Morris	406
Thompson, R. B	284
Truelson, A. R. N	331
Ullmann, Dr. J. E	939
Ulmer, R. E	406
Visher, P. S	1
Von Braun, Dr. Wernher	406
Wagner, Dr. C. J	331
Wall, R. W	207, 284
Walter, G. H	285
Webb, J. E	406
Weiss, Harry	390
Wiecking, Charles	368
Williamson, David	406
Wyatt, D. D	406

INDEX

C

	Page
Civil defense and defense mobilization functions of Federal agencies	284
Agriculture, Department of	285
Commerce, Department of	304
Summary of employment and obligations	315
Federal Aviation Agency	326
Federal Communications Commission	401
Health, Education, and Welfare, Department of	331
Emergency health activities	338, 340, 346, 349
Hospitals	350
Emergency welfare activities	343, 346, 358
Food and drug activities	342, 357
Medical stockpile	338
Positions, new requested	368
Summary of budget for 1963	344
Training program	339, 347
Housing and Home Finance Agency	368
Interior, Department of the	374
Labor, Department of	390
Small Business Administration	402
Special assistance activities	321, 325
Treasury, Department of the	398
Civil Defense, Office of	1
Administrative costs, Federal funds used for	105
After-effects of attack:	
Existence after attack	77
Fallout danger, duration of	57, 62, 73
Fatalities	9
Food and water problem	58, 73, 76, 80
Genetic aspect	74
Particles, fallout	61, 62
Deactivation of	63, 70, 73
Strontium 90, effects of	70, 73, 75
Survivors	15, 72, 75
Assistance to States, financial	130
Emergency operating centers	141
Criteria for construction	145
General Accounting Office report on	133
Personnel and administrative expenses	159
Employment	163, 166, 167
Management program	161
Schools, number and location of	167
Services rendered by other offices	165
Travel costs	165
Attacks on United States, level of	71
Authorization of program	37, 54
Clothing as radiation shield	59, 61, 69
Construction. (*See* Shelters, fallout.)	
Counterforce attacks	9
Defense Department, transfer of office to	46
Emergency operations	111
Communication and control	111
Damage assessment	117
Federal agencies, activities of other. (*See* Civil defense and defense mobilization functions of Federal agencies.)	
Federal contribution program	28

Civil Defense—Continued
Page
Foreign countries, involvement case of attack 13
Gamma rays, life of 63, 70
Habitability of fallout regions 57
Information on fallout protection, distribution of 43, 44
Military disarming attack 14
Military services, functions in case of attack 49
National Academy of Science Civil Defense Committee 68
Obligations 32
Operation and maintenance 86
Organization of civil defense functions 46, 50
Population centers, attacks on 16
President's program, scope of 16
Radiological fallout detection and monitoring 89, 105
Research and development 29, 45, 61, 168, 194
Contracts let 199
Measurement of radiation 61
Schools, number and location of 167
Shelters, fallout 168
Authorization for 185
Cost of 8, 17, 19, 39
1963–67 cost projection 32
Development of shelter system 18
Dual purpose of 38
Effectiveness of 67, 69, 81
Facilities and supplies provided in 20, 22, 37, 55, 179
Fallout shelter analysis courses 177
Feasibility of 64
Science magazine article on 65
Federal buildings, shelters in 40, 190
Federal-State cost sharing 83
Grants to nonprofit institutions 23, 173, 186
Applicants for payments 188
Eligibility for 186
Per capita cost 38
Schools 38
Incentive payments. (*See* Grants to nonprofit institutions above.)
Lives saved by 72
Marking and stockage program 20, 22, 37, 55, 179
Military installations having 41, 192, 193
Need for 5
People accommodated, number of 172, 188
Private 40
Protection offered by 7, 9
Protection required 58
Schools for training builders of 39
Space for 20, 24, 33
Summary of program 170
Survey on 20, 36, 82, 176
Architect and engineering firms used 177, 189
Ventilation of 185, 205
Soviet Union civil defense program 52
State and local participation 42
Stockpile maintenance 104, 106
Technical assistance given by Federal Government 24
Timing of program 51
Training, education, and public information 121
Adult education programs 129
Civil defense school 124
Pamphlets 124
Warning and detection program 89
NEAR system 89, 110

E

Emergency Planning, Office of 207
Budget for 1963, summary of 232
Continuity of government 211, 222, 246, 249

Page

Emergency Planning—continued
Control center, Denton, Tex 280
Disaster relief 212, 269
Emergency planning 244
Employment 212, 239
Executive reserve program 277
Functions and activities, new 214, 226
Funding of, Government-wide 231
Postattack planning 210, 213, 221, 262
Contracts with States 271
Department of Defense role 266, 268
Role of Federal and State Governments 213, 221, 267
Printing and reproduction 274
Research and development 258
Resource and production planning 251
Resources management 211, 222, 269
Responsibilities of 214, 225, 230
Salaries and expenses 236
State civil defense organizations 221, 229
Stockpiling activities 216, 228
Disposals 216, 219
Inventories 219
Telecommunications 255
Travel expenses 273

N

National Aeronautics and Space Administration 406
Acceleration of space program 425, 426, 887
Cost of 890
Advisory committees 502
Aircraft and missile technology 659
Supersonic commercial transport 661, 665
Cost of 671
Problems in development of 669
APOLLO project 543
Contract for spacecraft 551
Contractor for 527
Support facilities 738
Atomic engine, development of 520
Benefits from space program 444, 453, 455
U.S. firsts in space science 454, 460
Boosters:
Capability 457
Recovery of 580
Testing of 530
Budget for 1963, summary of 500
Budgets for:
Amount of 426, 428
Leveling off of 426
Budgets of cooperating nations 421
Budget structure, change in 439, 889
Business management system, development of 411
Cape Canaveral:
Agreement between NASA and Air Force on costs 623
Air Force, contract with 619
Range support operations at 619
Total cost of facilities at 726
CENTAUR launch vehicle 606
Chinese space and nuclear activities 451
Communications satellite systems 442, 445, 577
Construction of facilities 699
ADVANCED SATURN dynamic test facility 864
Ames Research Center 707
Atlantic Missile Range 702, 720
Addition to assembly facility for unmanned spacecraft 736
ADVANCED SATURN launch complex No. 39 744

National Aeronautics and Space Administration—Continued
Construction of facilities—Continued
Atlantic Missle Range—Continued
Page
ADVANCED SATURN-NOVA supporting facilities 746
APOLLO mission support facilities 738
APOLLO static test facility 749
Corps of Engineers, work performed by 735
Existing facilities, use of 721, 724, 725
Explosive-safe assembly facilities for unmanned spacecraft 737
Modifications to provide launch complex for solid suborbital vehicles 732
Modifications to SATURN launch complex No. 34 730
Modifications to SATURN launch complex No. 37 731
Modification to TITAN II launch complex 742
NOVA launch complex 750
Supporting facilities—existing area 734
Utility installations—existing area 743
Utility installations—new area 752
Cape Canaveral, total cost of facilities 726
Cost of, total 846
Facilities planning and design 737
Facilities with complete funding in 1963 703
Far East station, data acquisition facility 867
Flight research center 758
Goddard Space Flight Center 759
Goldstone station, advanced antenna system 863
Jet Propulsion Laboratory 771
Management of 777
California Institute of Technology, contract with 695, 779
Johannesburg and Woomera stations, antenna facilities 865
Langley Research Center 784
Gas dynamic facilities 802
Lewis Research Center 794
Nuclear rocket dynamics and controls facility 796
Plum Brook service facilities, modernization of 519, 799
Manned spacecraft center 810
Manned space flight control centers, various locations 875
Marshall Space Flight Center 523, 821
Construction costs, 1963 524
Michoud plant 838
Testing at 530
Mississippi test facility 844
Need for 529
NOVA stage test facilities 849
Testing at 530
NOVA stage manufacturing facilities 879
Nuclear rocket development station 850
Radiation effects facility 855
One-and-one-half-million-pound-thrust engine, facilities for 870
One-million-pound-thrust engine, facilities for 874
Pacific Missile Range 702
Rosman station, data acquisition facility 868
Space propulsion facility 520
Space radiation effects laboratory 878
Summary of program, by projects 705
Supplemental request for land acquisition 704
Two-hundred-thousand-pound-thrust engine, facilities for 872
Various locations 862
Wallops station 881
Contracts:
Air Force, contract for development of TITAN II 548
Amount of program let out on 888
APOLLO spacecraft contract 551
Approval of 515
Audit of 517
Contractors for SATURN, APOLLO, and NOVA 527, 531, 556
Contractors on space program, geographical location of 464, 497

National Aeronautics and Space Administration—Continued
Contracts—Continued Page
Examination of 450
Lunar and planetary exploration program 597
Overhead allowed contractors 549, 551
Over $25,000, listing of 466, 499
Profits 450
TITAN II, contractor for 548
With small businesses 497
Cooperation with other nations 411, 418, 431
Soviet Union 413, 422, 436, 463
Budgets of cooperating nations 421
Canadian and British satellites 415
Tracking sites 415, 422
Weather and communications fields 434
Coordination of operations 502
Cost of space program 427, 428, 442
DELTA launch vehicle 603
Department of Defense, reimbursement to 888
Dissemination of information:
Authority for 419, 430
Modification of 434
Availability and publication of space information 411, 431
Classification of information 433, 437
Public nature of space program, advantages of 424
Sharing with other countries 411, 418
Type of information released 433, 437
Distribution of funds by programs 510
Electrical power, development for use in space vehicles 645
Electric propulsion program 626
Engine testing 632
Engines:
Liquid hydrogen and oxygen fuels 567, 608, 641
Liquid propulsion 634
Cost of developing 640
Development of, competition for 639
Million-pound thrust 638
Cost of 640
Facilities for 874
One-and one-half-million-pound thrust 637
Facilities for 870
Two hundred thousand-pound thrust 638
Facilities for 872
Solid-propulsion program 568, 643
Employment:
Consultants 449, 514, 687, 690
Distribution of employees 512, 517
Huntsville, Ala 622
Evaluation boards 504
Fuels for engines. (*See* Engines.)
GEMINI project 410, 536, 542, 546, 548
German science team 457
Guidance systems, progress in 456
Information Office, cost of 689
Installations, number of 513
International Geophysical Year, importance of 462
Launch operations development 617
Cape Canaveral, range support operations at 619
Handling and transportation of large vehicles, studies on 624
Launch vehicles, summary of 606
Launch vehicle technology 613
Leadership of United States in space 422
Lewis Research Center:
Construction at 519, 794
Operations at 518
Liquid propulsion program 567, 634
Engines, size and cost of 637

National Aeronautics and Space Administration—Continued Page
Lunar and planetary exploration 592
Contractors for 597
Cost of 598
Ranger moon shot 597, 598
Value of program 600
VOYAGER program 599
Manned space flight 439
Advanced manned space flight 535
Aerospace medicine 540
Flight program 540
Manned spacecraft technology 539
Analyses of program, group organized for 426
Importance of 547, 571
APOLLO project. (*See* this title.)
Construction in support of 701
Emphasis in budget 427
Flight control centers 875
GEMINI project. (*See* this title.)
Man-to-the-moon flight. (*See also* Lunar and planetary exploration) 443
Achievement of 532
Cost of 442
Direct ascent 570
Expediting of program, cost of 890
MERCURY project. (*See* this title.)
NOVA project. (*See* this title.)
Rendezvous of spacecraft 410, 427, 546, 570
Schedule of flights planned 426, 429, 439
Systems engineering concept 547
Importance of 571
MERCURY project 532
Meteorological satellite program 442, 458, 572
Operation Deep Freeze 458
Soviet program 576
Military space program, relationship with civilian program 420, 424
NOVA development program 527, 547, 560
Contractors for 563
Cost of 563, 567
Need for 569, 642
Stage manufacturing facilities 879
Stage test facilities 849
Studies on 565
Support facilities for 721, 726, 746, 750
Nuclear power:
Atomic Energy Commission, research done by 657
Nuclear systems technology 652
Contractors for 654
Cost of 655
Nuclear rocket propulsion systems, development of 652
SNAP 8 program 520, 657
Observatories, importance of orbiting 427
Rate of progress of space program 425, 426, 887, 890
Reimbursement to Department of Defense 888
Rendezvous of spacecraft 40, 427, 546, 570
Research, development, and operation 505
Advanced research and technology 440
Summary of expenses, 1961–63 692
University programs 683
Consultants, employment of 687
National Science Foundation operations, relationship to 683, 686
X–15 airplane, development and testing of 755
SATURN C–1 525, 528, 553
Contractors for 527, 531
Cost of 526, 527, 554

National Aeronautics and Space Administration—Continued Page
SATURN, ADVANCED 525, 555
Bids on 558
Contractors for 556
Cost of 527, 556, 642
Dynamic test facility 864
Need for 569, 642
Stage test facilities 845
Support facilities for 721, 746
Architectural and engineering and overhead expenses 728
Contractor for construction 727
Land acquisition by Corps of Engineers 729
Testing of 530
Test stands for 524, 824
Time schedule for construction and vehicle development 727
Schedule of space program 426, 429, 439
Scientific satellites 587
Soviet program 588
SCOUT launching vehicle 601
Solar and chemical energy sources, development of electrical power from 645
Solid propulsion program 568, 643
Sounding rockets 582
Soviet satellite countries, space programs of 451
Soviet space program 451, 455
Exchange of information from scientific satellites 589
Lunar probes 460
Compared with U.S. program 452
Spacecraft technology 609
Space power technology 645
Space stations 571
Time schedule of space program 426, 429, 439
Tracking and data acquisition program 441, 672, 701
Contributions of other countries to 422
Manned spaceflight network 676, 679
Military operations 682
Personnel in foreign stations 446
Satellite network 678
Tracking stations 415, 447
Number of 674, 677, 681
Smithsonian optical, use of 680
Soviet 681
European 677
Travel costs 692
Unmanned space program, cost of 455
University program 683
Administrative costs, limitation on 693
Grant program 685, 692
Western operations office 514
X–15 airplane, development and testing of 755
National Aeronautics and Space Council 892

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