FISCAL YEAR 1978 SUPPLEMENTAL MILITARY AUTHORIZATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

NINETY-FIFTH CONGRESS

FIRST SESSION

ON

S. 1863

BILL TO AUTHORIZE APPROPRIATIONS DURING THE FISCAL EAR 1978 FOR PROCUREMENT OF AIRCRAFT AND MISSILES, ND RESEARCH, DEVELOPMENT, TEST, AND EVALUATION FOR THE ARMED FORCES, AND FOR OTHER PURPOSES

JULY 27, 29, AUG. 24, 29, 1977

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FISCAL YEAR 1978 SUPPLEMENTAL MILITARY AUTHORIZATION

WEDNESDAY, JULY 27, 1977

U.S. SENATE,
SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9 a.m. in room 224, Russell Senate Office Building, Hon. Thomas J. McIntyre (chairman) presiding.

Present: Senators McIntyre, Bumpers, Goldwater, and Garn.

Also present: Jack Ticer, chief clerk; Robert Q. Old, Larry Smith, George Foster, and George Riedel, professional staff members; Rhett Dawson, counsel; Louise Hoppe, research assistant; Betty Mayo, clerk; Susan Pitts, assistant to Senator McIntyre; Bill Jackson, assistant to Senator Cranston; Len Parkinson, assistant to Senator Bumpers; Ron Lehman, assistant to Senator Bartlett; Chris Lehman, assistant to Senator Harry Byrd; and Dave Fitzgerald, assistant to Senator Garn.

OPENING STATEMENT BY SENATOR THOMAS J. McINTYRE, CHAIRMAN

Senator MCINTYRE. The subcommittee will come to order.

The R. & D. Subcommittee meets today to begin its review of the fiscal year 1978 supplemental military authorization bill, S. 1863, which contains $445.6 million requested by the Department of Defense because of the B–1 decision. Most of this request is for R. & D., $348.6 million. And $64 million of the $97 million in procurement is directly derivative of the Department's R. & D. proposals.

[The bill S. 1863 follows:]

[S. 1863, 95th Cong., 1st Cong.]

A BILL To authorize appropriations during the fiscal year 1978 for procurement of aircraft and missiles, and research, development, test, and evaluation for the Armed Forces, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—PROCUREMENT

SEC. 101. In addition to the funds authorized to be appropriated under the "Department of Defense Appropriation Authorization Act, 1978" there are hereby authorized to be appropriated during fiscal year 1978, for the use of the Armed Forces of the United States for procurement of aircraft and missiles, and other weapons, as authorized by law, in amounts as follows:

Aircraft

For Aircraft: for the Air Force, $33,000,000.

Missiles

For Missiles: for the Air Force, $64,000,000.

TITLE II—RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

In addition to the funds authorized to be appropriated under the "Department of Defense Appropriations Authorization Act, 1978" there are hereby authorized to be appropriated during the fiscal year 1978 for the use of the Armed Forces of the United States for research, development, test, and evaluation, as authorized by law, in amounts as follows:

For the Air Force $333,600,000.

For the Defense agencies, $15,000,000.

This Act may be cited as the "Department of Defense Supplement Appropriation Authorization Act, 1978".

Senator McIntyre. The proposals in this bill and the related decision on the B–1 raise questions of the first order. If we are not to have the B–1, it is of supreme importance that we make sure that we have an effective and well conceived alternative strategic bomber force. Therefore, the Department of Defense must squarely assume the burden of proof in three areas of special importance.

First, they must demonstrate that their proposed future bomber force which will depend heavily on the long-range air launched cruise missile will result in no reduction in our strategic bomber effectiveness. To do this they must first define what this Nation's strategic objectives are and what portions of those objectives must be met by the bomber leg of the Triad in terms of clear, concrete indicators of military value.

Our independent review of this prime military issue requires an understanding of judgments which the Department made about Soviet air defenses and how we can effectively beat them in the 1980's. It requires that we understand how long-range cruise missiles would be integrated into the operating strategic force without degrading its effectiveness. This will be the primary focus of this morning's hearing.

I should mention from the outset that we are particularly interested in testing the hypothesis that our future bomber force would be best composed of a mixed force of standoff cruise missile carriers and penetrating bombers. We suspect this combination would greatly compound problems of the Soviet defense and thereby enhance deterrence. We suspect that the effectiveness of the B–52 as a penetrating bomber could be sustained longer if it were weaponized with internally carried new weapons such as the ALCM–A and the ASALM which would enhance the B–52's targeting flexibility, could be intimately integrated with SRAM's in practical military planning and could do so without any reduction in weapons loadings.

In addition to these military issues, the Department must also demonstrate that its specific requests are well conceived in fiscal, technical, and management terms. We are particularly interested in the role of the joint cruise missile office, whether the pace of the proposed programs is practical, whether the funds requested are required to do what is being proposed, whether the IOC's are determined by military requirements, and how the full scale development competition of the two long-range cruise missiles will be defined.

Third, the administration's proposal that we depend heavily on long-range cruise missiles necessarily raises a number of questions re-

lated to SALT. Many of the central SALT issues are beyond the responsibilities of today's witnesses and we will inquire in appropriate ways at another time.

Let me make it clear that I feel that we have the time and responsibility to think these questions through. The B–1 decision, was well hedged. This subcommittee has insisted for years on the development of an air-launched cruise missile and other advanced weapons technologies often against DOD pressures. Our subcommittee review of the survivability of our deterrent against major projected Soviet threats were exhaustive and reassuring.

In my judgement we clearly have a varied, redundant, and flexible deterrent force that affords us the time as a Government to make a sound decision about our future bomber force in the wake of the B–1 decision.

Moreover, the B–1 decision in my view does not require us to go beyond the sharp focus of the bomber component of the triad. Unless there is compelling evidence that a cruise missile force will degrade the bomber leg, there is no need to play "chicken little" and to rush to some major new system which would have all the disadvantages of the B–1, namely its cost, but without its prime advantage—stability.

Mr. Secretary, I am very pleased to welcome you here this morning. This is an opportunity to hear from you early in your career over there. With this very important decision made by the President, we find ourselves getting together again. I expect that you find, like I told you, that on Saturdays sometimes you don't get home or you don't get out very early.

Dr. PERRY. My wife has discovered I am not available on Saturdays very much.

Senator GOLDWATER. I have a statement.

Senator MCINTYRE. Senator Goldwater, glad to see you here.

STATEMENT BY SENATOR BARRY GOLDWATER

Senator GOLDWATER. Thank you Mr. Chairman. I cannot stress enough the importance of these hearings as we meet today to consider this supplemental request for $445.6 million to support alternative programs in lieu of the B–1. The President's decision not to produce the B–1 means a drastic change to our future strategic force structure, a force structure that has yet to be examined very carefully.

After almost 7 years of support for the B–1 by the Congress, we are suddenly being asked to drop that program in order to proceed toward a force that relies heavily on cruise missiles. This is a most serious change in the manned portion of the triad.

Consequently, Mr. Chairman, I urge that we take our time in consideration of this request in order to be sure that we, as well as the Department, understand the complete ramifications of this decision. As far as I can determine, there is no urgency that warrants rushing this request through. Since this request will become the basis for many new efforts and the expenditure of many hundreds of millions of dollars in the future, we need to establish the base line well, and we might find that many of the requests should be better considered in the fiscal year 1979 budget.

There are other reasons for not rushing into this matter. Some of the data provided by the Department to the committee in support of

this request has, at the very best, been lacking in substance. To me, this is a further indication that the Department is still attempting to "put its act together," as the result of the B–1 decision. I think that we will find that many of the program requests in this supplemental will be quite soft and where that is the case, we should not hesitate to turn down that request.

We also need to examine why things have changed to the extent they have if, in fact, they have. For example, last March in our bomber weapons hearings we were shown in a very professional way how and why the manned penetrating bomber, and in particular the B–1, was essential to the SIOP. Now, suddenly, the new administration discards that concept saying that it can do the job with cruise missiles. I look forward to being shown how this new strategic force for the mid-1980's will be able to carry out the strategic mission to the same extent a B–1 force would have been able to. I am doubtful that can be done.

Frankly, Mr. Chairman, it might aid our understanding of this matter if we asked the commander in chief of the Strategic Air Command to appear before the subcommittee to give us his views on this new strategic force and how he views the projected SIOP capability. I am not aware that, to date, his views are on record, nor am I aware if he was consulted on the decision. I think it would be helpful to our deliberations to have his views.

Mr. Chairman, it is obvious that we have a cart-before-the-horse situation here in that the B–1 production has been cancelled prior to the presentation to the Congress of any alternative program. It would have made far more sense to have continued the fiscal year 1977 B–1 program at a minimum level until some approval of this new program had been received. However, even though the administration rushed its alternative program to us, we need not rush our deliberations.

In that regard, Mr. Chairman, I appreciate your efforts to get this matter before the full committee by August 5, but I assume that is only if we get what we need from these hearings. Anything less than that and I would vote to put the entire matter off until after the August recess.

Thank you, Mr. Chairman.

Senator McIntyre. Well, Senator Goldwater, I echo your sentiments. We are under some pressure, as you know, to try to take care of this as expeditiously as possible, but the Chairman of the committee understands that there are new directions and new courses here that we feel have to be justified.

My plan is to go today and then to go over until Friday in order to get these statements in. Good questions can be prepared, and then I think that it may be necessary to try to agree on a date maybe in mid-August or sometime for another hearing during this recess.

My objective, of course, is to try to be able to report to the full committee right after we come back from the recess, but I am not going to be hurried and we are going to have the justification or I am not going to be recommending some of these monies.

Well, now, Senator Garn, glad to see you here.

Dr. Perry, why don't you go ahead with your brief statement.

We have all read ours, so I don't see any reason why you cannot read yours.

Dr. PERRY. Thank you.

STATEMENT OF DR. WILLIAM J. PERRY, DIRECTOR, DEFENSE RESEARCH AND ENGINEERING; ACCOMPANIED BY JOHN B. WALSH, DEPUTY DIRECTOR, DEFENSE RESEARCH AND ENGINEERING FOR STRATEGIC AND SPACE SYSTEMS; LT. GEN. ALTON D. SLAY, USAF, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT; JOHN HUGHES, DEPUTY DIRECTOR FOR COLLECTION OPERATIONS, DEFENSE INTELLIGENCE AGENCY; CAPT. WALTER LOCKE, USN, JOINT CRUISE MISSILE PROGRAM OFFICER, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; LT. COL. PAUL KAMINSKI, USAF, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; COL. FRANK THOMAS, USA, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; CAPT. JOHN BROWNLEY, USN, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; DR. HUA LIN, ASSISTANT DIRECTOR, OFFENSIVE SYSTEMS, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; BRIG. GEN. EMIL BLOCK, USAF, DEPUTY DIRECTOR, STRATEGIC FORCES, DEPARTMENT OF THE AIR FORCE; AND GORDON NEGUS, DEFENSE INTELLIGENCE OFFICER FOR STRATEGIC ARMS LIMITATIONS

Dr. PERRY. As you pointed out, this is the first time I have had a chance to appear before any committee since my confirmation hearings. It perhaps would be better if I had appeared first on a less controversial and less emotional topic, but that isn't the way it happened. I will assure you though whatever the controversy and topic I am here to give you objective data that will support you in the judgments that you have to make.

In my prepared statement I noted in the committee meetings last March, on the broad strategic issues, that you had made several statements I thought were pertinent to today's session. I will quote two of these:

You pointed out that in reviewing the B–1 this committee has insisted on the highest standards of R. & D. management of this extraordinarily expensive program, and you also pointed out the committee has successfully persuaded the DOD to hedge the B–1 decision by developing an alternative.

Basically, the Department has concluded that the B–1 was a well-managed program and would have met its technical and operational objectives. Moreover, that while it was indeed, an "extraordinarily expensive program" this expense would have been justified by its mission if no satisfactory alternatives were available. However, the hedge that was developed—the long-range air-launched cruise missile—turned out to be extraordinarily successful and, in our judgment, capable of meeting most of the B–1 mission requirements in the same time frame and at a reduced cost. This judgment was an important factor in the

decision to terminate B–1 production and to dedicate a major portion of the B–52 fleet to be used as cruise missile carriers.

Let me emphasize that this decision in no way represents a lack of support for the doctrine of strategic deterrence, nor of the triad as the cornerstone of that deterrent policy. We believe in the importance of the triad in order to assure any potential enemy of our ability to retaliate in response to aggression; such a promise of retaliation will thereby deter that aggression.

THE MANNED BOMBER AS A COMPONENT OF THE TRIAD

THE PROPERTIES OF THE MANNED BOMBERS COMPEL ITS RETENTION AS A COMPONENT OF THE TRIAD

- DIVERSITY
  - SURVIVAL: LAUNCH ON WARNING WITHOUT CATASTROPHIC CONSEQUENCE OF FALSE ALARM
  - PENETRATION: HIDES CLOSE TO GROUND INSTEAD OF OPEN HYPERSONIC ATTACK
- UNIQUE CAPABILITIES
  - CAN GO TO AIRBORNE ALERT TO ENHANCE SURVIVABILITY
  - CAN DEMONSTRATE RESOLVE BY LAUNCH
  - MANNED OPERATION PROVIDES VERSATILITY
  - PRIMA FACIE NOT A SURPRISE ATTACK WEAPON

The triad provides a diversity of survival and penetration modes in order to give us high confidence that we could retaliate even in the face of unanticipated Soviet breakthroughs in one or another area of defense that would allow interdiction of our strategic systems. In seeking this diversity, the manned bomber brings a uniqueness of survival and penetration techniques which compels its retention as a component of the triad. It survives through its ability to be launched on warning which can be made highly sensitive because the recallability of the bomber does not require that a launch be tantamount to execution of attack. It also offers the additional capability of enhancing survivability by airborne alert. The bomber has special capabilities which increase its flexibility as a tool of deterrence or diplomacy: We can demonstrate national resolve by launching bombers on airborne alert. It should also be noted that the bomber, by its very nature, is not a surprise attack weapon, and hence, should not be regarded by any power as threatening such a strike.

Therefore, the issue is not whether to have a bomber force but how to weaponize such a force. One option is to weaponize it with gravity bombs and short-range missiles; the other option is to weaponize the force with long-range cruise missiles which would be launched outside the Soviet Union.

In the first case, the bomber is required to penetrate; in the second case, only the cruise missile must be able to penetrate. So our analysis largely revolved on which of these is able with higher confidence to penetrate the extensive air defense of the Soviet Union. Up to a point, our penetration tactics are the same with each; that is, we evade the defenses by flying around them and by flying low and fast. In this respect each has about the same capability—and a significantly improved capability over the B–52. Also each degrades the defense radars—but in different ways: The B–1 by jamming the radars with its electronic countermeasures (ECM), and the cruise missile by presenting a remarkably small cross section to the radar which makes it difficult to detect—To a radar, the cruise missile presents a target [deleted] the size of the B–1. The B–1 has one additional tactic—it can suppress a defensive system by firing a SRAM at it. On the other hand, the cruise missile can saturate a point defense by sheer numbers. The combination of these tactics gives both the B–1 and the cruise missile a superior capability to penetrate the Soviet air defense particularly in view of present low-altitude deficiencies in this defense.

We may assume, however, that the Soviets will be working hard to overcome these deficiencies. Therefore, it is pertinent to question whether the B–1 or the cruise missile has greater growth potential to meet new and presently undefined threats. We believe that the cruise missile has an edge here.

CRUISE MISSILE DETECTABILITY

It is not clear how much long-term confidence we can place on improving the B–1's ECM; in fact, the ECM itself creates a potential vulnerability because the Soviets may [deleted] a missile which "homes" on the jamming signal. On the other hand, the cruise missile could be developed to fly faster and lower, and most importantly, it could be built with even lower detectability. I will have more to say later about the lower detectability of the cruise missile.

With the decision to make cruise missiles the primary weapon of our bomber force, the next question was to determine the most suitable carrier for these cruise missiles. Since the cruise missiles would be launched from a standoff position, several hundred miles from the border of the Soviet Union, the carrier is not required to penetrate. While the B–52 cannot compete with the B–1 as a penetrator, it is quite acceptable in the much less demanding role of a cruise missile carrier. The very significant cost of the B–1 could not be justified by the incremental improvement over the B–52 as a cruise missile carrier.

Even with primary dependence on the cruise missile to penetrate Soviet air defenses, it is desirable to maintain some penetrating bombers, to maximize the problem of the defense by confronting them with a mixed threat. Some portion of the B–52 force will be maintained and upgraded to be used as penetrating bombers for this purpose, and we believe they will be effective well into the 1980's. We will maintain R. & D. programs that give us the option to replace these when and if it becomes necessary. We propose to maintain the B–1 R. & D. program at some level for the next few years; we also will be investigating other lower cost alternatives such as upgrading the FB–111 with some of the B–1 components.

This overview is intended to give you an introduction to the detailed presentation which will follow. The first part of our presentation will describe the Soviet air defense, present and projected to the mideighties. This will be given by John Hughes, who is the senior intelligence adviser in the Defense Intelligence Agency and who has been a student of the Soviet missile program for 20 years. I say here in my statement, John has been a student of the Soviet missile program for 20 years. I might say I met John 20 years ago when we were studying Soviet missile problems, [deleted] so John and I have worked on the missile problem for a good 20 years now.

Lt. Gen. Al Slay, Deputy Chief of Staff for R. & D. for the Air Force, will follow with a description of how we plan to penetrate these air defenses. General Slay is one of this country's experts on the subject and is well known to this committee from previous appearances here. I will describe our cruise missile history, a description of technical characteristics and critical components, test results, and our program plan to achieve IOC by the first quarter of calendar year 1980. Then I will describe some of the actions that might be taken by the Soviet air defense in response to our cruise missile threat, and what R. & D. programs we are conducting to deal with these actions if they evolve to operational systems. Finally, General Slay will return to give a line-by-line description of the specific program in our proposed budget amendments.

We anticipate that most of the material in these later sessions will be of top secret level and are requesting an executive session in the event we are not already in one.

Mr. SMITH. We vouch for all the staffers in the room, and the Department vouches for their people.

Senator MCINTYRE. We have quite a bit to go. Proceed. I am glad to see General Slay here, and also Mr. Hughes, so we can go right ahead.

Dr. PERRY. I would like to mention in addition to that, we have Mr. John Walsh here from the D.D.R. & E., and Capt. Walter Locke, who is Joint Cruise Missile Program Manager.

Senator MCINTYRE. All right, go right ahead.

Dr. PERRY. Thank you. General Slay will be the lead-off witness.

STATEMENT OF LT. GEN. ALTON D. SLAY, USAF, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT

General SLAY. Mr. Chairman, I was asked by your staff to establish a baseline. Some of this that I will provide, you have heard before, but we thought it important to say what we are capable of doing today and how we do it in order to judge the effectiveness of the future system.

Senator MCINTYRE. We appreciate the explanation. We had a hearing that I thought was excellent.

General SLAY. Some of the slides that you will see today are from that hearing.

[Chart deleted.]

This is our current SIOP force in numbers of weapons. You will notice that throughout the SIOP we have some [deleted] [deleted]

weapons plus [deleted] weapons. These [deleted] weapons are from the theater forces of NATO, principally. Pershing, for instance, is a [deleted] weapon.

These are our aircraft and other weapons that we have currently on alert. We have [deleted] B–52's and [deleted] FB–111's on alert, 24 hours a day, 7 days a week. We have the numbers that you see here, [deleted] B–52's and [deleted] FB–111's that are committed to the SIOP but are not on alert. We are currently at 30 percent alert posture. We have been as high as 50 percent, and we were at 40 percent for some time. We are currently at 30 percent.

The other aircraft that you see listed on alert and also committed are fighter aircraft that are capable of carrying nuclear weapons.

You will notice that we have our ICBM force almost all on alert, with very, very few that are in a nonalert status. In the case of the Minuteman II and III, they are very seldom taken off alert in order to perform maintenance.

Senator GOLDWATER. What is the Buccaneer?

General SLAY. Buccaneer is a British aircraft, sir. It is an aircraft that has a double capability as an attack system, a nuclear and conventional attack; also, they use it in a sea patrol, sea control type mission.

Senator GOLDWATER. Is it a light bomber?

General SLAY. It is a light bomber. It is very capable. It is not as big as our FB–111, but has about the same mission—not FB but F–111.

Senator GOLDWATER. Jaguar and Vulcan?

General SLAY. Vulcan is what the British would call a heavy bomber. We would call it a medium bomber. It has been around for many, many years. You remember it as a delta-type aircraft.

The Jaguar is a very small aircraft. It has been built jointly by the French and the British, and it is an aircraft that is about the size of the F–5E [deleted].

THE SUBMARINE FORCE

There are [deleted]. Contrary to any of the other systems, the submarines in our strategic plan have a category that they call [deleted].

PERSHING

[Deleted] Pershings on alert with [deleted] additional on a nonalert status.

[Chart deleted.]

This chart shows the contribution of this force to our strategic effort.

On the left you see nuclear delivery vehicles showing that the ICBM's comprise something over 50 percent, 52 percent; bombers, 20 percent, of which the B–52 [deleted] percent and FB–111, [deleted] percent; the submarines, 28 percent. That is nuclear delivery vehicles.

NUMBER OF WEAPONS

The largest contributor is the sub force due to the large number of RV's that Poseidon can carry, 47 percent of the total weapons. The bomber force carries 30 percent of the weapons and the ICBM force

23 percent. Of the bomber force of 30 percent, [deleted] percent are carried by [deleted] the FB–111.

EQUIVALENT MEGATONNAGE

That is nothing but a statistic but it is useful in order to compare what the various elements of the triad carry. The bulk of this as far as percentage is carried by the bombers, due to the fact that they carry large freefall weapons, [deleted] with the B–52.

The subs account for 16 percent of the megatonnage and ICBM 32 percent.

[Chart deleted.]

This shows the growth of the target base with time and this is again from the strategic target planning manual. That is not so much as a growth of actual targets as it is an identification of targets, because perhaps a lot of these targets that we are showing today were actually potential targets back in time area but were not identified.

It shows the growth of numbers of weapons that we have to apply against that target base and the decrease in the total megatonnage that is to be applied against that target base.

Naturally, as you add RV's for instance, to a Polaris missile or to a sub launched missile or Minuteman, you reduce the total megatonnage that you can carry aboard that missile.

Senator GOLDWATER. Do you think that is important?

General SLAY. Yes sir, I do, and I think that, due to the [deleted] of the target structure the right move is to [deleted].

Senator GOLDWATER. When the B–52 first came out didn't we have a bomb of [deleted].

General SLAY. We have never carried it tactically aboard the B–52 that I can recall. We did have a bomb, I am not sure it was ever on alert with the B–52.

Senator GOLDWATER. Does that rapid decline [deleted] disturb the Strategic Command?

General SLAY. No, sir, not really, as long as the numbers [deleted].

Senator GOLDWATER. You are talking about [deleted].

General SLAY. [Deleted.] We have a [deleted] and [deleted] on freefall. [Deleted] is the largest we have. The bulk of our force [deleted] in the freefall force.

As you know, we have [deleted] in our Minuteman III force and [deleted] in our Minuteman II force. The big bang, of course, is the [deleted].

This is just a review because the next couple of charts will refer to these target categories. These target categories are assigned by the joint strategic capability plan.

No. 1. [Deleted.]

[Deleted.]

Senator GOLDWATER. As a matter of interest, why are you [deleted]?

General SLAY. We are not [deleted].

Senator GOLDWATER. [Deleted.]

General SLAY. [Deleted.]

Next chart. [Deleted.]

How are they applied in our various elements of the triad? Over

here on the left, this shows [deleted].

[Chart deleted.]

Now, I thought I would spend just a moment on this because it is central to a chart that I am going to use later to establish a baseline from which to judge our future force.

DAMAGE EXPECTANCY

We in the Air Force headquarters and also in the Strategic Planning Staff, use a measure of merit known as damage expectancy. This measure of merit, damage expectancy, is not only related to the weapon itself but includes an estimate of prelaunch survivability on the ground in the United States or at sea, the reliability of that weapon, probability of penetration to the target, and probability of destruction. Damage expectancy is all of that.

Now, for instance, we are required on a number of targets to get say [deleted] percent probability of destruction against that target. On a lot of weapons you will see later we cannot achieve that with [deleted] so we have to have a computation that compounds the damage and adds [deleted] as we go down the road in order to achieve a desired damage. And that is what we use this formula for, for compounded damage expectancy.

Part of the computation that we use on aircraft sitting on alert and submarines sitting on alert is prelaunch survivability. We say—and this is the strategic plan—our alert bombers have a [deleted] percent probability of surviving in an alert status without prewarning.

[Chart deleted.]

This is for a "bolt out of the blue." Perhaps an unlikely case, but we are required to plan for it in a nonalert situation. If they are sitting back off alert—not at the end of the runway they only have a [deleted] probability of surviving in that condition.

The subs, if they are [deleted] in other words, [deleted]. If they are or [deleted] the Navy computes [deleted] depending upon the location of that particular submarine and so forth.

ICBM's, alert and nonalert, are both [deleted] today. If they are [deleted] which is a particular category that we use in our SIOP computation, [deleted].

Senator GOLDWATER. Do those figures bother you?

General SLAY. In what way, Senator?

Senator GOLDWATER. The [deleted] of an out of the blue attack.

General SLAY. Sir, that is all that is. It is a function of how many bombers we want to keep on alert. If we keep, as right now, 30 percent on alert, that means that 30 percent have a high degree of expectancy of being able to get off the ground. Those that are not on alert are just going to get [deleted] of getting destroyed. That is just the way it sits. It is a matter of deciding if you want to hold a high alert rate, which we can do and have done in the past, even to the extent of having airborne alert; but when you do that, there is something that you give up, and naturally that is the reliability and getting your force tired. And so the decision has been made by the Air Force, by the way, to drop that alert rate, and with the concurrence of CINCSAC. We dropped the alert rate down to 30 percent.

We can go back up but it is just a matter of expecting more than just a bolt out of the blue type of warning. We figure there will be inevitably some form of strategic warning. That is the best explanation that I can use.

[Chart deleted].

WEAPON SYSTEM RELIABILITY

That is the weapon system reliability, bombers quite high, theater aircraft, average, [deleted] ICBM's, quite high. One thing that is interesting, the Minuteman III is shown in the plan as [deleted] reliability, but that is for three RV's versus one in Titan and Minuteman. The Polaris, [deleted] and the Poseidon, [deleted]. Of course it has several RV's also.

Senator GOLDWATER. Before you leave those figures, I want to ask a question that has bothered me and I thought you might get to it.

Have you cut the reliability of our ICBM? If I am not mistaken, [deleted]. Am I right on that?

General SLAY. You are absolutely correct.

Senator GOLDWATER. Let's say that the CEP is, [deleted]. How do you arrive at this when you have [deleted].

General SLAY. Sir, we have, of course, fired many of them down the trough, as a lot of people say, into the islands in the Pacific. We have systems out there, radars and optical measurement systems, that can measure precisely what the CEP is against a particular target. And over a period of years we have developed a data base so that we have high confidence that the ICBM force can achieve the accuracy we now state.

A lot of people have said, and I do not believe this, I do not subscribe to it, that the fact that we are firing in a particular direction all the time greatly degrades our confidence in that accuracy.

I can say that perhaps firing on a different azimuth with different geodetic problems is going to degrade the accuracy somewhat, [deleted].

The SIOP accuracies that are used for target planning take all of these things into account.

I am, Senator Goldwater, highly confident that we can, under actual launch conditions, get the accuracies out of our Minuteman force that we have claimed because we have a large body of experience behind us.

Senator GOLDWATER. I would feel a lot better if you would just shoot one at something someday.

General SLAY. Yes, sir, out of an operational silo. We tried that at one time.

Senator GOLDWATER. I remember once I was chided by Art Buchwald for saying our missiles had never been tested, were not accurate, and I would be willing to sit in a rowboat out in the Pacific and be shot at, and I said; yes if I could have Robert McNamara with me.

General SLAY. Sir, as you remember, we had an attempt at one time to have an operational launch out of a real silo and a real silo field and we had to put that in the too tough file due to environmental considerations.

[Chart deleted.]

Some of the members of this committee have seen this chart before but I use it just as an example of the one of the problems that SIOP planners have in putting in a laydown of various types of weapons. This is a section of real target in a real SIOP. [Deleted.]

[Deleted.]

Senator GOLDWATER. What would be the diameter?

General SLAY. [Deleted.]

Senator GOLDWATER. [Deleted.]

General SLAY. [Deleted.]

Senator GOLDWATER. What would be your PSI at the outside?

General SLAY. The PSI on the outside [deleted].

Senator BUMPERS. How about the center of the burst?

General SLAY. The center of the burst would be [deleted]. John help me.

Mr. WALSH. Depending on how close to the center you got, it would be [deleted].

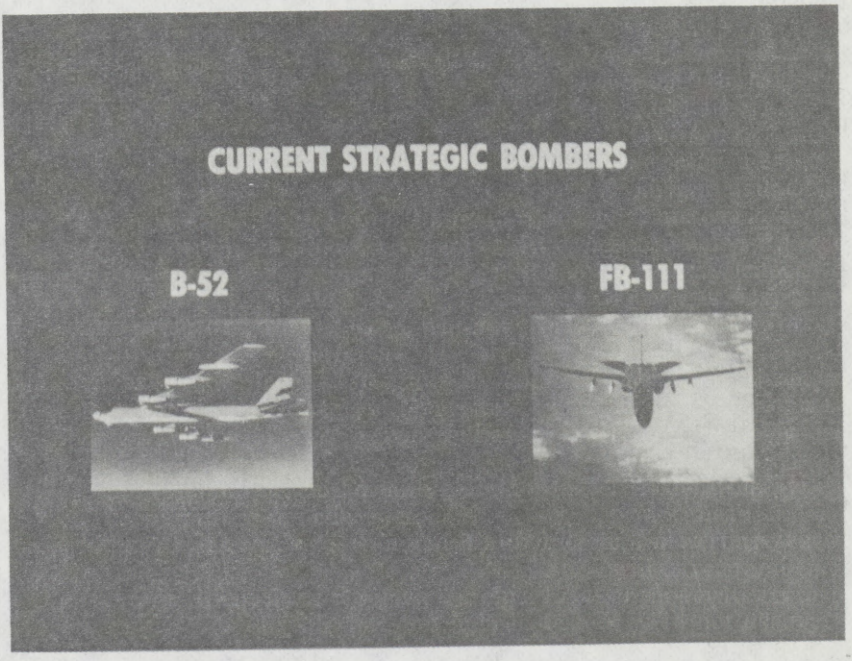
General SLAY. I would say [deleted] anyhow near the center.

Mr. WALSH. [Deleted.]

Senator BUMPERS. [Deleted.]

Mr. WALSH. [Deleted.]

General SLAY. It is a function—it decays in a cube function.



Getting now into our current strategic bomber force, these are the well known B–52 and FB–111. This shows the history of our bomber force. It peaked out in about 1960 and has since been decaying until now we have just under 400 bombers in our current force. The number of strategic bomber weapons in the U.S. stockpile is [deleted].

[Chart deleted].

This is where our force is located. We have 19 B–52 locations throughout the United States and two FB–111 wings at Plattsburg and Pease. I have already gone over the rest of that data.

The only other thing I would say is that this is an aging force, as has been noted before.

Our B–52D's are 21 years old. B–52G's, 18 years old, and the B–52H's are 16. The FB's are reasonably new, 6 years old. [Deleted.]

The gravity weapons that they can carry are shown here. All of the B–52's can carry [deleted].

[Deleted.]

Accuracy of delivery of these gravity weapons, with current avionics aboard the B–52, is about [deleted] nautical miles. We are upgrading currently the B–52 G and H force. We have a program to upgrade that to get better accuracy.

The [deleted] is more accurate at about [deleted] nautical miles.

Senator BUMPERS. Why is one more accurate?

General SLAY. Because of its avionics system. It has better bomb nav system—it is a more modern navigation and bombing system.

Senator GOLDWATER. What altitude are you figuring that accuracy from?

General SLAY. We are figuring it from [deleted] altitude, below [deleted] feet.

Senator GOLDWATER. Go ahead.

General SLAY. Now, again, they can demonstrate much better accuracies than these. These are operationally degraded accuracies. What I am giving you today is what is in the plan and this is what the SIOP has laid down and they expect degraded accuracy to that extent.

If you go to Plattsburg and ask an FB–111 crew if they can get better than [deleted] accuracy, they will say you must be crazy, yes, they can go out and lay that weapon down and show you better accuracy. The SIOP plan has to count on somebody shooting at him. It has to discount the crew's state of mind in a peacetime environment where they can get better accuracy.

Senator BUMPERS. Does that last figure over there mean the FB–111 can carry twenty-four 500-pound bombs?

General SLAY. Yes, sir.

Senator BUMPERS. The B–52B and B–52H only carry 27?

General SLAY. That is right, simply because we have never bought racks to go internally into those to carry more than that. Now, the D, due to the fact that we modified the B–52D strictly for that corollary role, can carry a whole great big bunch 108.

Senator BUMPERS. The B–52G's and H's have the ability to carry the same load if they are modified?

General SLAY. If they were modified, that is correct. They have not been modified to do it.

I won't go over this chart in detail except to point out a few things in comparison between the FB–111 and B–52. Of course you know the B–52 is four times as large. The takeoff distance is very significant. The takeoff distance for prelaunch survivability is 7,400 feet for the FB–111 fully loaded versus 10,500 feet for the B–52. Takeoff interval is less for the FB–111 due to the size and lack of wing wash, jet wash [deleted] internal payload is weapons versus [deleted] internally, although both can carry external weapons. One important point here.

B-52/FB-111 CHARACTERISTICS/PERFORMANCE

	B-52	FB-111A
GENERAL CHARACTERISTICS		
CREW SIZE	6	2
TAKEOFF WEIGHT	488,000	109,800
TAKEOFF DISTANCE (FT)	10,500	7,400

The B–52, due to the fact that it has á large wing and fuselage, has a large cross section. Therefore it is less capable of withstanding overpressure and gusts than is the FB–111. The FB–111 [deleted].

So these two phenomena sort of cancel each other as far as the sure safe escape capability of the [deleted] weapons.

As has been pointed out, the B–52 has [deleted] the radar cross section, nose-on as compared to the FB–111.

[Chart deleted.]

The types of weapons that we carry aboard these aircraft shown here I will only deal in the yield here, the number of weapons, and the average age of these weapons. [Deleted.]

In computing how many weapons we need to put on a target we have something else to think about.

[Deleted.]

Senator GOLDWATER. What would the B–1 have done?

General SLAY. [Deleted] sir.

[Chart deleted.]

The next one. This is a circumstance that we like to envision, [deleted].

In real time, if we see on our radar homing and warning gear an indication [deleted].

That is very, very important to us because of the possibility, or probability depending upon your bias, of mobile SAM's moving into a particular area. [Deleted.]

[Chart deleted.]

Here is the case for unplanned threats. [Deleted.]

Senator BUMPERS. What is the range of their most effective SAM?

General SLAY. It depends upon whether you are at low altitude or high altitude, but about [deleted].

Senator BUMPERS. How about the [deleted].

General SLAY. [Deleted.] That sounds like a lot but that is about a go-around.

Senator MCINTYRE. How far from the Soviet Union border would you typically take the plane to a lower level?

General SLAY. [Deleted.]

Senator BUMPERS. When you say you go to a low altitude, [deleted] how low?

General SLAY. We go right down to [deleted].

Senator BUMPERS. What is the speed of the B–52?

General SLAY. [Deleted.]

The reason we can't go any faster than that is that the B–52 is a big brute. It has flappy wings and the dynamic pressure at higher speeds would be just too great for it. The FB–111 actually can go supersonic but he can't go anywhere because he uses a lot of fuel. So the FB–111 would penetrate at [deleted].

Senator GOLDWATER. The B–1?

PENETRATION CAPABILITY

General SLAY. [Deleted.] The B–1 could penetrate at [deleted] but for fuel conservation reasons we are too much in the drag rise and we would penetrate the B–1 at [deleted].

Senator GOLDWATER. What is the radar comparison between the B–1 and B–52?

General SLAY. Nose on, [deleted] times as great for the B–52.

[Chart deleted.]

General SLAY. This is the sortie that I just described, taking off from [deleted].

[Chart deleted.]

Every one of the blurbs that you see here is a freefall weapon. The little triangle is a SRAM. You will notice that where he comes in is a potential area for the [deleted].

[Chart deleted.]

This next chart is a blowup of the first portion of that flight, [Deleted.]

[Chart deleted.]

This is a 10-minute time slice of the SIOP. Each one of these bomber symbols here is a B–52.

The B–52, if it has a dotted line behind it, [deleted]. Each delta symbol is an FB–111, and if it has a green dotted line, he is [deleted]. If you see a solid line that means this aircraft is [deleted]. It is a complicated chart but I think it shows the SIOP in its true perspective.

People normally think of the SIOP as [deleted].

Senator GOLDWATER. Do we have in our plan the use of our NATO tactical air forces for air superiority for the bombers?

General SLAY. [Deleted.]

Senator GOLDWATER. Do you have that in your plan?

General SLAY. [Deleted.]

Senator GOLDWATER. [Deleted.]

General SLAY. Yes, sir, that is the value of being a fighter pilot, Senator.

Our penetration capability is the last element, other than the probability of destruction, that goes into making up the SIOP damage estimate. [Deleted.]

I refer to this chart again just to refresh your memory. Prelaunch survival, weapon system reliability, probability of penetration and probability of destruction make up damage expectancy. The next charts that you see will refer to damage expectancy. All of these factors are taken into consideration on these next charts.

This chart shows the various categories of targets, to [deleted].

All this chart shows is a baseline for the information that you will see on the next slide.

[Deleted.]

I think the rest of this chart is self-explanatory.

[Deleted.]

Right here is where John Hughes comes back in. He will take us into 1985 for the threat, and then I will come back and try to put what we would do with the new force—I am sorry, Dr. Perry comes back in after John and describes the new force.

Senator McIntyre. Then we will come to how the cruise missile into the 1980's is going to take over from the bomber?

General Slay. Yes, sir.

Dr. Perry. General Slay comes back on to go through the same sort of analysis with the improved force against the improved defense.

[Deleted.]

Mr. Hughes. Sir, that concludes my brief review of their capabilities.

Senator McIntyre. All right.

Senator Goldwater. I would like to ask one question relating to the cruise missile which you haven't touched on.

The last time I was in Boeing, from what they told me, it is not going to be operationally ready by 1980 at the present rate of progress.

Now when do you think that the cruise missile, either one, will be operationally ready, that is, the avionics, the terrain-following ability and our knowledge of the terrain, when will it be ready to hit targets?

Dr. Perry. Our cruise missile?

Senator Goldwater. Yes.

Dr. Perry. If our proposals that we are making today are accepted and we can start this acceleration in the beginning of this coming fiscal year, we are projecting an initial operational capability in the first quarter of 1980.

Senator Goldwater. It will take a lot more work than you have been putting on it?

Dr. Perry. We have high confidence in the 1980 operational date for the cruise missile. I hope to describe enough of our program to you today that you may share this confidence.

Senator McIntyre. Dr. Perry, you are up.

Dr. Perry. John Hughes has described to you projected improvements in the Soviet air defense. I am going to describe to you now the proposed improvements in our strike force and in particular improvements by the addition of cruise missiles in the strike force.

I will start off with a very brief definition of cruise missiles in the sense in which I use the words. I simply mean an unmanned aerodynamic vehicle which carries a warhead.

Now cruise missiles, as you know, are not new weapons; they have been around since the 1950's. The Soviet Union in particular has been steadily plugging away at the development and production and deployment of dozens of different models of cruise missiles deployed in the thousands.

The first Vugraph on the top depicts the Soviet cruise missiles, beginning back in the early 1950's, up to the present time. They come in air-to-surface versions and surface-to-surface versions.

The bottom part of the Vugraph depicts a burst of activity in the United States in the 1950's in which we developed a half dozen cruise

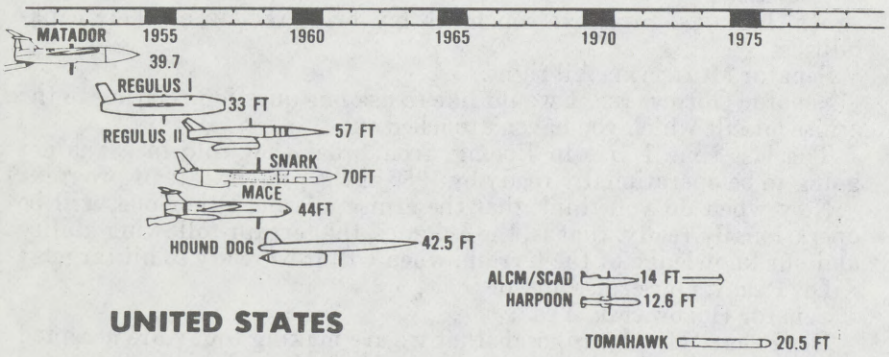
missiles. We essentially terminated that activity in favor of ballistic missiles in the late 1950's, and then new initiatives started in 1970, based upon new technologies.

Dr. PERRY. What I would like to do is draw a sharp distinction between the cruise missiles which you see here and this new generation of cruise missiles being developed in the United States today.

They depend on new technologies and they have dramatically different performance characteristics than these earlier cruise missiles.

CRUISE MISSILE BACKGROUND

[DELETED]



CRUISE MISSILE CHARACTERISTICS

	ALCM (AGM—86B)	TALCM (AGM—109)
● PHYSICAL		
• LENGTH	234"	219"
• WEIGHT	2900 LB.	2650 LB.
● PERFORMANCE [DELETED]		

The next chart depicts the characteristics of the so-called ALCM and TALCM, the two different cruise missiles, air launched cruise missiles under development in the United States today. I would like to point out some, I think remarkable, features in performance. First of all, if you look at the table ahead of you, you will see models of those two missiles. They are less than 20 feet long, as depicted in the chart up there, and they weigh less than 3,000 pounds.

Now, the really amazing performance characteristics of these missiles is they will carry a [deleted]. This revolutionary performance improvement has been made possible by some technologies which I will describe to you now and I will also describe some of the operational conditions of these technologies.

The first one to notice is the development of what I might call a micromin. We have loved to talk about microminiature electronics.

Here I would like to talk about a micromin engine that is used in the Tomahawk missile. I have with me today the predecessor to this engine on the table so you don't have to estimate the scaling. This engine is slightly smaller than the Tomahawk engine you see here but gives you an idea of the size of the engine we are talking about, compared with the typical jet engine. Of course you have an amazing difference in size.

This engine generates [deleted] of thrust, a turbofan engine, and it is capable of carrying this missile almost [deleted.]

Now, that is one of the very critical developments to make the capabilities of this missile possible.

Senator GOLDWATER. Does that use JP fuel?

Dr. PERRY. Yes, sir, that uses JP–4.

Captain LOCKE. If I may amplify?

Dr. PERRY. This is Captain Locke of the Joint Cruise Missile Program.

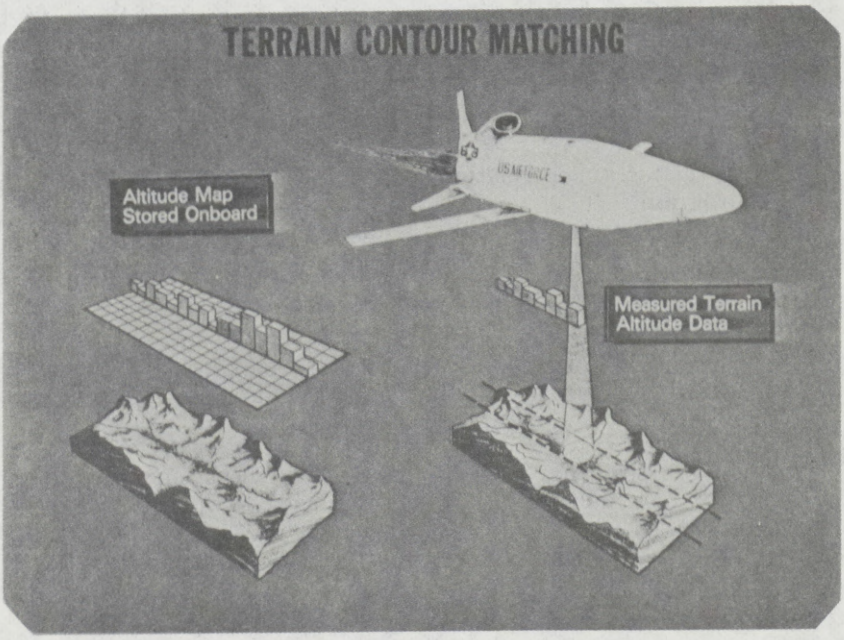
Captain LOCKE. It can use JP–4, JP–5, or JP–9 gasoline, just like an airplane. Different fuel control settings are required.

Senator GOLDWATER. How many pounds of fuel will it take to carry it its maximum range?

Captain LOCKE. [Deleted.]

Dr. PERRY. While we are looking at models, let me show you the model of the next component, which is critical to this technology, which is the guidance system.

This is the TERCOM guidance system which is used on the cruise missile. This is the system which makes possible the [deleted] accuracy. Again the microminiature technology is the key to being able to keep the weight down and keep the range up on this missile as well as provide accuracy.



The system flies on an inertial guidance system, which this chart depicts. After it is launched it flies on its inertial guidance system up to a point over the [deleted] which is called the land fall point.

The altitude data at this point is stored in the computer of the guidance system. The altimeter looks down and determines the altitude profile and on that basis determines whether it is 500 feet to the left or right or forward or backward from where it should be. [Deleted.]

Having done that then it corrects, makes its final correction, and proceeds on to the target.

So the guidance system is a combination of the inertial guidance system and the automatic pilot combined with this TERCOM or terrain correlation matching system.

I have two more charts to explain this TERCOM system to you. It is in a sense detailed technology, but in another sense it is crucial to the subject of this program, so I would like to explain to you how it works.

As the cruise missile flies over a point on the ground—this is one of the check points—it has an altimeter which measures the altitude as it proceeds. And these blocks depict the measurements of altitude along the flight path.

Prior to the flight of the missile, we computed an altitude map from aerial photography of that part of the world, and stored in the computer was the predicted altitude profile.

So as he flies over, he has stored the predicted altitude profile and he is measuring the actual altitude profile, and the trick is to correlate these two in such a way that they can determine his error.

[Chart deleted.]

With great trepidation I would like to show you how that works. [Deleted.]

At the time he takes that measurement we can see that the in flight profile is not lined up properly with the flight, and that is because his position was [deleted].

[Deleted.]

Having determined that error it then corrects it and puts itself back on course.

That is the terrain correlation system and it is crucial to the success of this program.

Senator GOLDWATER. Will this require a complete mapping of all the possible routes for weapons that we might use?

Dr. PERRY. Yes, sir, it will, Senator Goldwater, and I will describe that to you in just a minute.

Senator GOLDWATER. All right.

Dr. PERRY. The next point I wanted to make was the accuracy which we are achieving with this system. This chart represents the predicted performance of the system.

[Chart deleted.]

As you can see from my last description, the accuracy will be a function of how far you are from your last checkpoint. We predict that you can get theoretically somewhat better than [deleted] accuracy at the check point. The correlation process I described to you can give you something better than [deleted].

As you depart from that checkpoint, the accuracy will be degraded because the inertial guidance system will not be able to maintain that same level, out to something like [deleted].

The accuracy which we are taking as the probable accuracy for the TERCOM system in its operational mode is [deleted].

[Chart deleted.]

This chart depicts the actual performance of the system during the flight tests that we have conducted with it.

Each one of these points represents a cluster of measured data taken during tests. Here directly at the check point, 5 miles from the checkpoint, 15 and 30 miles from the checkpoint, you see the cluster of experimental data here, and the circle is the circle which encompasses 50 percent of the experimental points, and thereby was used as an estimate of CEP. So far our experimental results have been as good as or better than our theoretical predictions.

Now, the next question of significance is what is the payoff from this kind of accuracy?

[Chart deleted.]

In this chart we attempt to give you some feeling for that. On the bottom of the graph we have accuracy [deleted]. We have represented on the vertical part of the graph the probability of damage, and the three VN different curves here represent three different targets.

This is a relatively soft target. This is a medium hard target. This is a very hard target, [deleted] in this case.

[Deleted.]

The next point I would like to make about the cruise missile is the penetration altitude.

[Chart deleted.]

This chart depicts a flight that was actually made during the test runs. This is the terrain over which it was flying. Here it is flying over relatively smooth terrain and it approaches a mountain range. Now the way the terrain system works, the TERCOM systems works, it will go also around to accommodate those uncertainties or those variations in altitude, and as it approaches a peak it then has to fly up.

[Deleted] feet, and it depends on the nature of the terrain. Over relatively moderate or smooth terrain it [deleted]. As it approaches mountains of this sort, it has to rise to allow clearance for those mountains [deleted].

When it is flying over water where there is no uncertainty about the peaks ahead, it can fly at [deleted].

So we have these wide ranges of altitude but [deleted] is a representative number for penetration altitude if it is flying over smooth or moderate terrain.

RADAR DETECTION

In the case of mountainous terrain the problem of radar detection is diminished because the radars are facing the same masking problems that the missile is facing.

Let me give you some numbers to depict the importance of altitude in terms of radar detection.

At 50 feet, a radar can see a target if the radar itself is not masked at 10 miles. At 500 feet, 30 miles, and at 5,000 feet, 100 miles. This is simply because of the line of sight limitations.

At 50 feet it can be seen 10 miles away. At 500 feet, 30 miles away.

To put it another way. At 50 feet, the area in which a radar could be located and still see the target is 300 square miles approximately.

At 500 feet it is 3,000 square miles, and at 5,000 feet it is 30,000 miles. So the effect is very, very dramatic.

What it simply amounts to is that as the missile or the bomber gets higher in the air it becomes visible over a much greater area.

From a defense point of view, the higher the missile is flying the fewer radars are needed to detect it. And, conversely, the lower it is flying the more radars.

If you recall Mr. Hughes' early chart of the coverage of radars in the Soviet Union where he depicted some of them with small circles and some with large circles, he was simply representing that same effect.

Senator GOLDWATER. If you have [deleted] wouldn't the blip tend to be confused with the ground clutter?

Dr. PERRY. Yes, sir, in fact, you anticipated my next point, Senator Goldwater. What I have described to you so far does not take account of the cross section of the target. It simply says the radar has an optimal line of sight to it.

Having a line of sight to it is one thing. Being able to detect and track it is another, and when any target, an airplane or bomber, is flying low, the radar is looking not only at the target, it is also looking at ground reflections and ground clutter at the same time. It cannot help but look at the ground. Therefore, it gets this unwanted return along with the return of the target.

The importance or radar cross sections in conjunction with low altitude is that they are synergistic. When it is flying at low altitude it picks up this clutter, and the radar's ability to pick that target out of clutter hinges on how large the target is. For a small target it is very difficult for radar to extract the signal out of the background clutter.

[Chart deleted.]

Now, the next chart will depict the radar cross section.

I have tried to find an imaginative way to present radar cross section because it is a very important concept and I have to tell you I failed. This is not an imaginative way of presenting it, it puts up some numbers and compares them with each other. I will come back to the radar cross section point later because it is such an important point.

This simply represents the radar cross section measured in square meters.

Senator MCINTYRE. What is that in square feet? I haven't made the metric jump yet.

Dr. PERRY. It would be about 10 times that.

Senator MCINTYRE. Ten times [deleted].

Dr. PERRY. Ten times [deleted]. Each one of these numbers would be approximately multiplied by 10.

I will make a conversion for you but in slightly different terms. Instead of describing to you the cross section in the area I will describe it to you in diameter.

This B–52 will be on the chart at about [deleted]. You have to understand the radar cross section is not only a function of the size of the target, it is a function of the shape. You can have two targets of equal size and one will have less cross section than the other because of the way it is shaped. To describe this to you I would like to normalize to bring everything down to a sphere and I will describe the case of the B–52. If you replace the B–52 with a target of equivalent size but different sphere you would have a sphere [deleted]. So you might imagine, if you would, a weather balloon [deleted] coated with metal. It would present the same cross section to a radar that the B–52 does flying head on to the radar. Now, that is a very large target. I think you can measure it.

The B–1 or the F–111, which is about the same size in cross section, presents a target about [deleted] and that is easy to imagine, because from where I am to our table and about the height of the room is about [deleted].

On the other hand, the cruise missile cross section would be about this size. If this were coated with metal and were flying along, it would look like a cruise missile to the radar. Again I am talking about nose-on and cross sections only.

We think that our technology will permit us to bring the cross section of the cruise missiles down to about this size. [Indicating.]

Senator GOLDWATER. Will the cruise missile carry ECM?

Dr. PERRY. [Deleted.]

It is also possible, and [deleted].

Well, what I have described to you are some very significant technological achievements that this country has made since about 1970. The microminiature engine, the micromin guidance system, the greatly reduced radar cross section—and I haven't described it, but the improved warhead is another important component of the total.

All of those come together to create what we are calling an air-launched cruise missile.

I have described to you this technology and I have personally said that I have confidence we can achieve this. Let me describe to you some of the problems in achieving it now and try to communicate some of the confidence to you.

[Chart deleted.]

If you could go back to Senator Goldwater's question, this map depicts [deleted].

Senator BUMPERS. Say that again.

Dr. PERRY. If the target area is smooth, perfectly smooth, if it does not have differences in altitude, then it will not form a distinct altitude profile, a finer print, if you will, and TERCOM system will be incapable of working. [Deleted].

[Chart deleted.]

The next chart will depict it. This is a little hard for you to see. [Deleted.]

Senator GOLDWATER. How important is altitude of the terrain?

Dr. PERRY. Altitude of the terrain is important, but it is the difference of altitude that is more important. Even if you are flying over country that is near sea level, if there is a roughness to that terrain

then we have sufficient change of elevation in order to get an altitude profile.

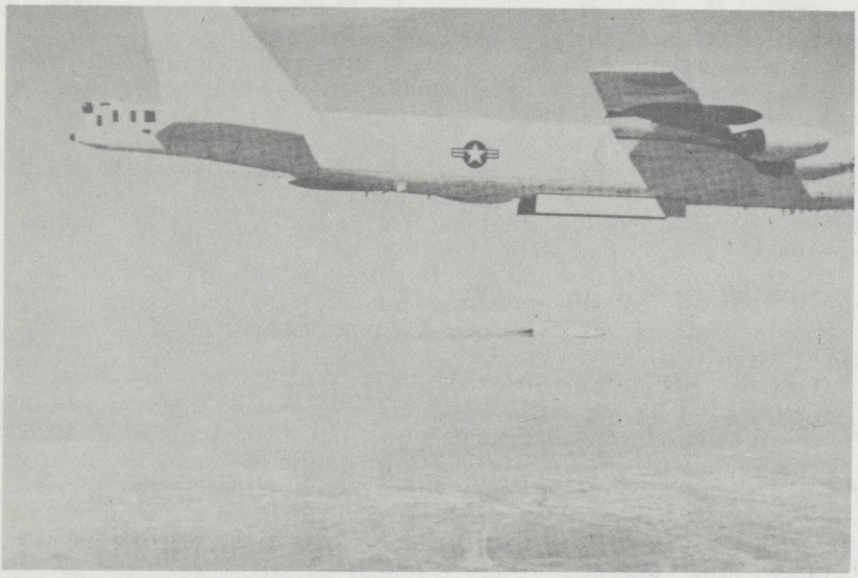
Senator BUMPERS. If you had a city in the middle of the desert could you use that? Would that give you enough altitude differential to use it as a check point?

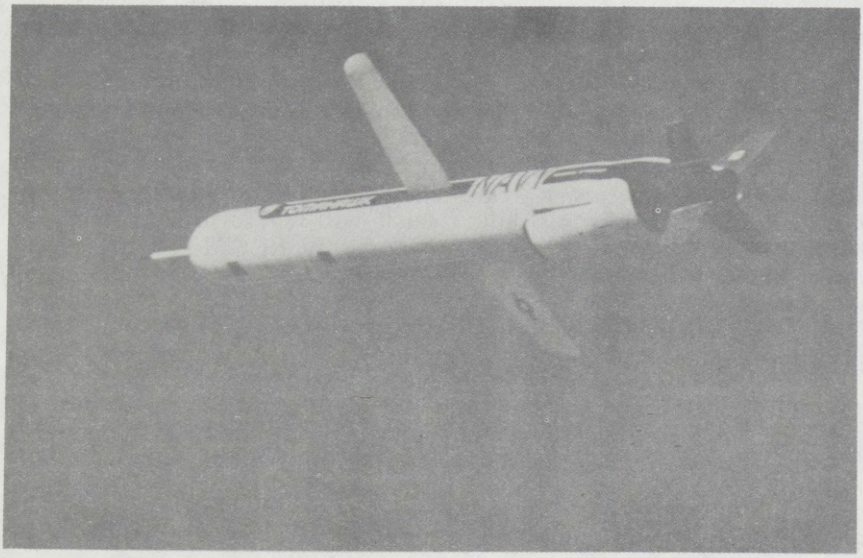
Dr. PERRY. I think the answer to that is no. Do you want to comment on that?

Dr. LIN. [Deleted.]

Senator BUMPERS. All right.

Dr. PERRY. The next set of charts I am going to show you simply describes some of the test results. This is ALMC–A, the short-range version of ALCM, being launched from the B–52.





The next chart shows a picture of the Tomahawk during its test flight, and the last chart is simply tabulation of the results. Let's hold that off.

CRUISE MISSILE TEST RECORD

TOMAHAWK

SUCCESS RATIO 18/22

FLT SEQ	LAUNCH MODE	SUCCESSFUL
1	UNDERWATER	YES
2	UNDERWATER	YES
3	AIR	YES
4	AIR	YES
5	AIR	YES
6	AIR	YES
7	AIR	NO
8	AIR	YES
9	AIR	NO
10	AIR	YES
11	AIR	YES
12	AIR	YES
13	AIR	YES
14	AIR	YES
15	AIR	NO
16	AIR	YES
17	AIR	YES
18	AIR	YES
19	GROUND	YES
20	AIR	YES
21	AIR	YES
22	UNDERWATER	NO

ALCM

SUCCESS RATIO 4/6

FLT SEQ	LAUNCH MODE	SUCCESSFUL
1	AIR	YES
2	AIR	YES
3	AIR	YES
4	AIR	YES
5	AIR	NO
6	AIR	NO

2874-7

This tabulation of test results indicates we have had 18 out of 22 successful Tomahawk flights. The bulk of these flights were launched in the air; none of them, however, was launched from a B–52.

In the case of the ALCM, we have launched four successfully out of six firings. All these were done in what you might call an operational environment. They were all launched from the B–52.

The way we view this test program right now relative to these two missiles is that we have certainly demonstrated in our test program that we have successful cruise missile and that we are ready to move into our full-scale development. We have in the Tomahawk program maturity of test flights, and in the ALCM program we have the maturity of mating with the aircraft. We don't have both of those in any one missile and it is important to get that activity underway in the very near future.

As we described to you our proposed budget amendments, we will describe the specific test program we are proposing for the next year. Fundamentally, what we would like to do is take both of these missiles, go into the intensive development test and engineering program and go into an operational test and evaluation program that effectively is a flyoff between these two missiles to decide which one will go into production.

TOMAHAWK FLIGHT TEST

Now, the last thing I would like to show you is a movie of an actual Tomahawk flight test.

This is the Tomahawk launched from its aircraft. The aircraft is an A–6. Now you see it in flight. The first few stills are from Tomahawk in its antiship role, which is not of particular interest to us right now but I thought you might be interested. Here it is flying over the water. That is the chase aircraft behind it. This is a view from the Tomahawk. That is what the ocean looks like from the Tomahawk. [Deleted.]

Captain LOCKE. [Deleted.]

Dr. PERRY. This is a slow motion shot going over the ship. Here we are back at regular speed again. You are about to see it launched from the truck-mounted launcher.

Captain LOCKE. That last one you saw was the first time the missile went from boost to sustained flight. Previously, when the missiles were launched from the airplane there obviously was no boost phase. This is off San Clemente Island, went through boost, into the glide and was recovered in just a couple of miles.

This is at White Sands Missile Range on one of the first flights. It looks like the second flight—the second flight went into the terrain following mode.

[Deleted.] White Sands is fairly desolate; it does give us all types of terrain.

This scene was again from the camera on one of the fins, and there was an overcast today so the ground doesn't show up too well. [Deleted.]

[Deleted.] That flash indicates it was over the target and it was scoring with the camera on the ground.

Mr. OLD. That terrain is not considered too flat for it to determine where it is?

Captain LOCKE. This terrain right now would not be used for making a fix, it is too flat. Before, you could see the type of terrain which looked relatively flat but is suitable for fixing. [Deleted.]

This is the runway at Hill AFB and the end of it. When it gets right on target the strobe light will flash. There were not two different flights, this is the same flight as earlier and the second pass over the targets. The smoke is from chase airplanes. One of the other things we achieved in our efforts on survivability was to avoid making smoke, and that is an advantage of the turbo-fan engine.

Dr. PERRY. Senator McIntyre, what I have represented to you is that we have developed a very significant new weapon here. I believe personally that this is probably the most significant military weapon developed this decade.

I would like to followup with two separate presentations to you. In the first one, General Slay will describe how the introduction of this capability into the strike force would be utilized to achieve SIOP objectives. When that is completed, I would like to describe to you where this technology is going.

The system I have described to you is the first generation of the cruise missile which is just beginning to exploit the new technology.

Senator GOLDWATER. Have you made any test flights at Eglin?

Dr. PERRY. No, sir.

Senator McIntyre. Are you gentlemen able to keep on until we finish the whole thing?

Dr. Perry. Yes, sir.

[Short recess.]

Senator McIntyre. The committee will come to order.

I believe General Slay will proceed to discuss the next phase of the operating air-launched cruise missile in the strategic bomber force.

General Slay. Mr. Chairman, this is a postulated scenario with several assumptions I will talk to you about.

Since this is 1985, I have nothing concrete to tell you, other than the fact that we have a plan to get to point B from point A.

What I have just shown you in the previous presentation I made to you is fact; this is not, this is a postulation.

We assume in 1985 [deleted]. There are many variables; bomber and cruise missile penetrativity is an example, as Mr. Hughes has indicated. There are system improvements we can make, as Dr. Perry has pointed out, to the cruise missile and to the bomber. The quality of defense, as was pointed out by Mr. Hughes is quantifiable to a certain extent certainly, when you are projecting eight years into the future, it could change. That is a variable.

Target system evolution—how much hardening will they do, how much dispersal will they do, will the target system continue to expand—those are variables. I have made some assumptions as you can see.

[Deleted.]

Your staff asked that we compute, if we could, how many weapons would be required to keep the bomber force at the level of effectiveness that it is now. I have had to make some gross assumptions here. I will explain those as I go through.

That force would consist of cruise missiles, SRAM's and bombs.

[Chart deleted].

This is the target-based projection. The chart that I showed a moment ago has [deleted] targets in it at the end of 1976.

The intelligence people are projecting that this [deleted] as you saw a moment ago. [Deleted.]

[Chart deleted.]

POSTULATED FORCE STRUCTURE

This is the postulated force structure that I have used, If you ask me where I got it, I can describe it.

I have assumed, we will keep our entire B–52H force as a penetrating force. That is our best B–52, the youngest B–52. We have said—I have, at least—that we have [deleted] which is a good and effective weapon. [Deleted.] It is a good weapon. I have taken the residual SRAM, [deleted]. That is a sufficient number of SRAM's to equip [deleted]. That is our penetrator G force. That is my judgment; it could be more, it could be less. I have assumed [deleted]. I have postulated that by that time we would be down to [deleted]. In other words, [deleted].

[Deleted.]

That [deleted]. We will go through how we will use those.

[Deleted.]

[Deleted.] Naturally, in the mid-1980's, we are going to have to upgrade systems, particularly ECM and avionics, in order to do the job that we have to do; ECM because of the increasing threat, avionics in order to be able to react to that threat, and in order to be able to destroy the targets which we know will be getting hard.

[Deleted.]

[Chart deleted.] This is a lead-in to show the type of activity we foresee. I have several charts which show the [deleted] and the way that we would lay down the force in both a penetrating and a standoff as well as a combined mode.

[Deleted.]

[Deleted.] As a particular slice of the pie at any given moment, you could expect something like this.

[Chart deleted.]

These are the profiles that I have just briefed, plus the FB–111 posing a relatively monumental task for the defenses. This is a projection of that same 10-minute slice that you saw a moment ago.

[Deleted.]

I am saying that, Mr. Chairman, with this force, this is the way that I would employ it if I were the SAC commander in 1985 with this job to do.

[Chart deleted.]

I thought I might also show this particular chart, to indicate the [deleted].

[Deleted.]

I have one more chart after this to answer a question that your staff asked.

Mr. SMITH. Could you throw the last chart back?

General, how far would be standoff, [deleted].

GENERAL SLAY. [Deleted.]

Mr. SMITH. Does the line reflect any computation for a penalty for operational——

General SLAY. Yes, it reflects—that is not [deleted].

Mr. SMITH. [Deleted] percent operational penalty, you calculate?

General SLAY. Yes, sir.

Mr. SMITH. [Deleted.]

General SLAY. [Deleted.]

Again, you have to recognize that this is a very postulated thing and this is not a SAC plan. I certainly want to stress that. This is my idea of how I would employ this force in the SIOP as I know it today.

This next chart responds to a question that your staff requested that we attempt to deal with.

[Chart deleted.]

I want to show this chart to you to indicate how I arrived at those conclusions.

[Deleted.]

This chart says that within a [deleted] you have the capability of destroying [deleted]. This is in relation to a question that was asked earlier.

Of course, as you go in toward ground zero, the over-pressure gets much, much higher and you can destroy much, much harder targets.

[Deleted.] That is just a pure correlation of the yield of the two weapons.

If you take a [deleted]. Now that will grow—I don't know to what degree that will grow—but this is what it is today. You will notice that with the [deleted].

What this says is that for [deleted].

As you get over here into the extremely hard targets, the [deleted] naturally.

But at any rate I just wanted to go through this type of analysis to show how I got to this next chart, which is the final chart of my briefing.

[Chart deleted.]

I showed a moment ago a slide that gave the [deleted].

[Deleted.]

[Chart deleted.]

This chart indicates that [deleted].

[Deleted.]

This type of analysis says that today, projecting forward to 1985, we would need around [deleted] weapons in the inventory to maintain the current level of capability that we have in our bomber force.

There is one thing that is quite obvious to the committee, I am sure. Whether we have ALCM or not, we are going to have to increase the number of weapons, simply because we face improved defenses and target growth.

So a portion of that increase would be there regardless in order to hold up our leg of the triad.

This is a very involved explanation, but your staff asked yesterday that we do the best we could in coming up with something that would give you an idea of what the future might hold.

You remember that I started off by saying that we needed in the bomber force about [deleted]. I am using that as a ballpark estimate until we have time to correlate and do a better job of analysis.

That concludes my briefing.

Senator McIntyre. [Deleted.]

General Slay. Yes, sir, unequivocally.

Senator McIntyre. All right. Who wraps this up. Dr. Perry?

Dr. Perry. Mr. Chairman, we believe that the force which General Slay described to you will be capable of penetrating the Soviet defense as projected by Mr. Hughes through the mid-1980's. However, beyond that point, beyond the mideighties, the projection gets hazy.

First of all, we lose our ability to estimate, to extrapolate from what the Soviets are now doing the farther out we go; and second, the projection may not take adequate account of the reaction of the Soviet Union, a specific reaction to our move to employ cruise missiles, and we need to consider in addition to these projections, feasible moves that the Soviet Union might take that would complicate our penetration.

[Chart deleted.]

Hold up the slide a little bit, will you, please?

I want to just describe in simple terms three reactions which they might undertake. I am not projecting they are going to do this, I don't have any way of knowing whether they will do it, but it is technically feasible and it certainly will be reactions which they would consider making.

[Deleted.]

[Deleted.] We don't know it is that good. If I imagine it is that good, if I further imagine that they [deleted].

Again I want to stipulate this is not a projection, it is just what if.

The second move they might make is to develop and make a [deleted.]

[Deleted.]

In this feasibility analysis I am saying what if they [deleted].

[Deleted.]

And if I imagine they develop one [deleted].

Those are three excursions that the Soviet Union might take, that are within their capability to take, we believe. Each one of those three that I described to you would have an economic investment cost comparable to our B–1 decision. I can't give you exact dollars on it, but any one of the three described to you is going to be approximately the same in investment decision for the Soviets that a B–1 decision would be.

The aggregate of all of them would, of course, have enormous consequences on the Soviet economy, and it would have enormous consequences on the resources left for other parts of their development.

So one might question whether they would make that strong a move, but for the purpose of my discussion now I am going to accept that maybe they would.

Now, the first point I would like to make about it is that it will take them a long time to convert the decision into a real operational threat, [deleted]. But we should keep our R. & D. going in appropriate ways so that our reaction time can be suitably short.

I don't submit that we ought to have a system to counter every threat they might employ.

[Deleted.]

So what I am going to describe now is some of the R. & D. programs which we have under way now and which we are proposing that anticipate a threat of a nature I am describing to you to keep our technology in such a state that if one of those threats or several of them develop, we will be able to respond to it effectively and promptly.

One of the things which can be done in our R. & D. that is not now presently planned for the cruise missile is to have an [deleted]. The flight path that was described to you in the previous discussions [deleted]. If the Soviets were to [deleted].

General Slay described to you earlier what the bomber does about that. [Deleted.]

Second, [deleted]. This is a question which Senator Goldwater asked earlier. I described the R. & D. and the program which could lead to [deleted] and that makes a very, very significant difference in the size of the problem.

[Deleted.]

I might say I have worked in the electronic countermeasure field for most of my career and it is a very disturbing task to be in an airplane continually competing with hundreds of radars on the ground. It will be a pleasure to confront the problem of competing with another radar in an airplane where he has the same conditions you have. I think we can attack that problem with high confidence.

[Deleted.]

The technology is fairly straightforward to develop and improve [deleted] of the type we have described here, to make incremental improvements in the [deleted] so that we can expect [deleted] as a fairly confident outcome of evolutionary improvements in [deleted].

The desirability of the [deleted] has to do with giving us the flexibility to respond to the Soviet Union [deleted]. If they do that, we have [deleted] obviously different alternatives. [Deleted] which General Slay was referring to earlier.

In this respect, the limitation may not be technology, the limitation may be strategic arms treaties.

[Deleted.]

In addition to those four initiatives I have described to you, there are two major initiatives I would like to describe which have applications to a variety of these different moves which the Soviet Union might make.

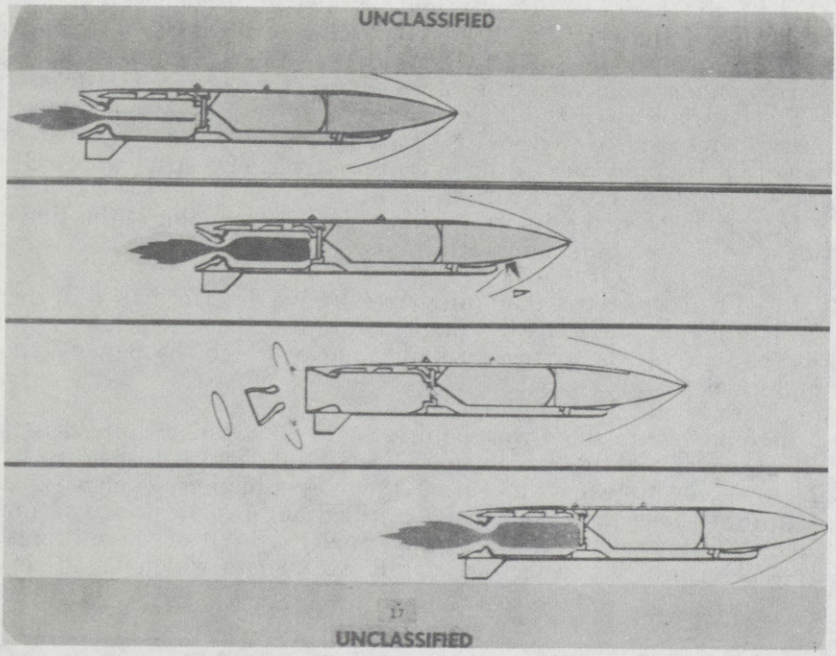
[Chart deleted.]

I would like to show you the first chart now. This simply lists the categories of reaction which the Soviets might make. Instead of listing them in systems, I'm listing them by function—[deleted].

If they make these moves, I described our responses to you on a functional instead of systems basis; [deleted]. All of these things I have described to you in some detail, except two which I will cover now.

[Deleted.]

[Deleted.]



[Deleted.]

What applications could be imagined? Well, we would envision [deleted].

[Deleted.]

[Chart deleted.]

If I look at the applications, one of them, which I described to you, is the possibility of using [deleted].

[Deleted.]

I showed you earlier that this is our current ALCM, and this is where I believe we can go in our second generation. And the consequences of this to the defensive systems are profound. We are pushing them to fundamental limits when we [deleted].

A major part of my conviction that the cruise missile is a very effective and very significant military weapon is based on its [deleted].

I want to take just a minute to describe to you the basis of this belief.

[Deleted.]

[Chart deleted.]

On this chart, I have illustrated the results of about a year and a half of R. & D. work in this field, it is a technical chart and I will try to oversimplify it to get the essence of it.

[Deleted.]

[Deleted] scale model that we have built is indicated on this. It came in after the chart was drawn up and it is in asterisk form on it. [Deleted.]

I would give you one caveat on these results. If you think of them as being like wind tunnel tests, that is the stage that we are in in this development now.

I am not here to tell you that we can with high confidence build a cruise missile to these specifications and deploy it in the next few years. We view this as a second generation to the present cruise missiles. But I have high confidence in these results that we are getting to the second generation and we are getting to it in a suitable time frame. [Deleted.]

Now, Senator McIntyre, we have held a full discussion of this project at a very limited access level. It is, however, highly relevant to the subject that we are talking about today, and I would offer to arrange for a more detailed briefing on it to selected members of your staff that you would like to specify for this. I think it would be important to have this background.

Senator McIntyre. We may find it necessary.

Mr. Smith. We have been exposed to this in some detail but as the Chairman says, it may well be useful.

Dr. Perry. We have been looking at applications different from this application when we started the program.

Senator McIntyre. Is this one of your new R. & D. starts?

Dr. Perry. We have had projected two answers to this question, two different R. & D. starts that relate to this. One of these is a DARPA program. [Deleted.]

[Deleted.]

Mr. Smith. If I may, Mr. Chairman, there is a difficult procedural problem here. Dr. Perry, it's good you offered the comment you did, because we have got to work out the procedural issues and it will take some work to do it. I think that is probably as much as one ought to say on the record.

Dr. Perry. Yes, sir. I would like to summarize comments in the R. & D. as follows:

I have imagined at the beginning of my discussion the most highly reactive Soviet response to the cruise missile threat that I can. I don't project that but I can imagine it. It is a formidable threat. It is a typical Soviet threat in that they are solving the problem by addressing the problem by the brute force approach.

I have then described to you what our technological responses to that will be and I am offering you some confidence that we are up to those challenges.

We have in some respects significant advantages over the Soviet Union in our technology. One of them which Senator Goldwater mentioned earlier is in our computer technology, and that is pervasive through many of the programs I have described to you, whether it be [deleted]. We must protect that technological lead.

Second, we have technological advantages in areas that are not so obvious: [deleted]. All of these lumped together give me high confidence that we are going to be able to respond to any imagined reactions which the Soviets might make to our initiatives.

We are describing to you in the cruise missile program the first generation, first application of a new technology. There is very great room for growth and for improvement and we expect to be making that improvement over the next decade. Thank you.

Senator McIntyre. Well, gentlemen, Mr. Secretary, we appreciate the fact you have helped lay out and get us back into the school in

which you people work every day. I hope on Friday now, if it is agreeable, that we can go into the programs and get into your justification for the requests that have suddenly been thrust upon us.

Senator GOLDWATER. I am wondering how much of this presentation was available before the decision on the B–1?

Dr. PERRY. Could I answer that in two ways, Senator Goldwater?

Senator GOLDWATER. Yes.

Dr. PERRY. The presentation itself was prepared for this committee, and this is the first time the presentation as such has ever been given. The data which goes into this presentation was all available and presented to the Secretary of Defense prior to his recommendations to the President. In particular, [deleted]. The data on the threat which Mr. Hughes described and the various penetration techniques were the results of a fairly extensive study that was done in February, March and April of this year.

Senator GOLDWATER. General Slay, how much of the Air Force was presented with this information before the B–1 decision? Did the SAC Commander have this information available?

General SLAY. Yes sir, he does. [Deleted.]

Senator GOLDWATER. And General Jones?

General SLAY. Yes, sir, he does have that. He knows the technology program.

Senator GOLDWATER. My question was did he have this before the B–1 decision was made?

General SLAY. Yes, he did. General Jones knew about this technology before.

Senator GOLDWATER. I am talking about the overall data that could have been used as an argument to stop the B–1? Was this ever presented?

General SLAY. Cohesively and collectively, Senator Goldwater, I can't say that it was, but certainly I can personally vouch for the fact that General Jones knew about ASALM because I briefed him on it. He knew about the [deleted] because I was with him when George Heilmeier briefed him on it. I have had discussions with him on that. He is certainly familiar with the cruise missile technology that we have going. But whether or not all of this was pulled together as you put it in an argument against the B–1, I doubt it, Senator Goldwater, but he certainly knew the elements of it and that is about as far as I could go on stating to that.

Senator Goldwater. We can get into that one Friday.

General SLAY. Yes, sir.

Senator MCINTYRE. All right, then, without objection, thank you very much, gentlemen, we will see you Friday morning.

Dr. PERRY. Thank you, Mr. Chairman.

[Whereupon, at 12:45 p.m., the subcommittee was recessed to reconvene at 9:30 a.m. on Friday, July 29, 1977.]

FISCAL YEAR 1978 SUPPLEMENTAL MILITARY AUTHORIZATION

FRIDAY, JULY 29, 1977

U.S. SENATE,
SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met pursuant to notice at 9:30 a.m., in room 224, Russell Senate Office Building, Hon. Thomas J. McIntyre (chairman) presiding.

Present: Senators McIntyre, Goldwater and Schmitt.

Also present: Larry K. Smith, Robert Q. Old, Rhett Dawson, George Foster and George Riedel, professional staff members; Louise Hoppe, research assistant; Betty Mayo, clerical assistant; Susan Pitts, assistant to Senator McIntyre; Bill Jackson, assistant to Senator Cranston; Len Parkinson, assistant to Senator Bumpers; Ron Lehman, assistant to Senator Bartlett; Rick Asplin, assistant to Senator Culver; Dave Fitzgerald, assistant to Senator Garn; and Charles Stevenson, assistant to Senator Culver.

OPENING STATEMENT BY SENATOR THOMAS McINTYRE, CHAIRMAN

Senator MCINTYRE. The subcommittee will come to order.

This morning we are happy to again welcome Dr. Perry, our new Director of Defense Research and Engineering, and his team of witnesses.

Dr. PERRY. Thank you, Mr. Chairman.

Senator MCINTYRE. Dr. Perry, Mr. Walsh, General Slay, it is my understanding this morning you will tell us, the members of this subcommittee, why you need this money, then we will have a chance to ask a few questions. Is that correct?

STATEMENT OF DR. WILLIAM J. PERRY, DIRECTOR, DEFENSE RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE; JOHN B. WALSH, DEPUTY DIRECTOR, DEFENSE RESEARCH AND ENGINEERING FOR STRATEGIC AND SPACE SYSTEMS; LT. GEN. ALTON D. SLAY, USAF, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT; CAPT. WALTER LOCKE, USN, JOINT CRUISE MISSILE PROGRAM MANAGER; LT. COL. PAUL KAMINSKI, USAF, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; COL. FRANK THOMAS, USA, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; CAPT.

JOHN BROWNLEY, USN, MILITARY ASSISTANT, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; R. HUA LIN, ASSISTANT DIRECTOR, OFFENSIVE SYSTEMS, OFFICE OF DEFENSE RESEARCH AND ENGINEERING; BRIG. GEN. EMIL BLOCK, USAF, DEPUTY DIRECTOR, STRATEGIC FORCES, DEPARTMENT OF THE AIR FORCE; AND GORDON NEGUS, DEFENSE INTELLIGENCE OFFICER FOR STRATEGIC ARMS LIMITATIONS

Dr. PERRY. Yes.

Senator MCINTYRE. Is that the understanding? Will you proceed?

Senator GOLDWATER. I have to be excused a few minutes at 10:30. I have to say a few words on the floor, and I will be right back.

Senator MCINTYRE. All right. Sorry to have to lose you. We are delighted you have been here so much.

Senator GOLDWATER. Thank you very much.

Senator MCINTYRE. Dr. Perry, go right ahead.

Dr. PERRY. Mr. Chairman, our presentation today will be in two parts. The first part will be given by General Slay, who will describe the line-by-line program elements in our proposed budget amendment, the rationale for them, and a description of them. The second part, the smaller part of the two, I will give a description of the advanced technology components. These programs would be done by DARPA and they are directed to what I would call the [deleted] generation cruise missile, the technology programs which could lead to a [deleted] generation cruise missile.

First General Slay will describe the advanced testing and the competitive flyoff of the two first generation cruise missiles and some of the technology which would ultimately lead to a second generation.

With that, I would turn the program over to General Slay.

FISCAL YEAR 1978 B–1 BUDGET AMENDMENT

General SLAY. Mr. Chairman, as you well know, the decision to cancel the B–1 program resulted in a DOD response for cruise missile initiatives.

DECISION TO CANCEL THE B-1 PROGRAM

DOD RESPONSE

CRUISE MISSILE INITIATIVES

STRATEGIC BOMBER UPGRADE

TACTICAL WARNING / ATTACK ASSESSMENT IMPROVEMENTS

In the amended budget there was a considerable amount of money for strategic bomber upgrade as well as money for tactical warning and attack assessment improvements.

During the briefing, I will cover this in three parts, one on this item, one on this item and one on that item, I will have a separate block for each one of those.

SUMMARY OF ADDITIONAL REQUEST

	RDT&E	PROCUREMENT	O&M	TOTAL
CRUISE MISSILE INITIATIVES	$258.0M	$64.0M	$3.4M	$325.4M
STRATEGIC BOMBER UPGRADE	70.6	33.0	0	$103.6M
TACTICAL WARNING/ATTACK ASSESSMENT IMPROVEMENTS	20.0	0	0	$ 20.0M
TOTAL	$348.6M	$97.0M	$3.4M	$449.0M

In those three blocks we have a total of $325.4 million in "Cruise missile initiatives," $103.6 million in "Strategic bomber upgrade," and $20 million in "Tactical warning and attack assessment improvements."

Senator GOLDWATER. Are you going to develop what the total cost for a B–52 will be to bring it up to what you feel you need?

General SLAY. Yes, sir.

Senator GOLDWATER. That is what I am interested in.

General SLAY. Yes; we will.

CRUISE MISSILE INITIATIVES

	ORIGINAL REQUEST	AMENDED REQUEST	DELTA
RDT&E:			
ALCM	$123.9	$173.9	$+50.0
TOMAHAWK (AIR LAUNCHED)	0	103.0	+103.0
CRUISE MISSILE CARRIER AIRCRAFT (CMCA)	0	90.0	+90.0
CRUISE MISSILE TECHNOLOGY			
DARPA	3.5	18.5	+15.0
AIR FORCE (FUNDED UNDER STRAT. BOMB. ENHANC)	0	0	(+9.9)
PROCUREMENT:			
CRUISE MISSILES	40.6	104.6	+64.0
O&M:			
DMA - TERCOM	0	3.4	+3.4

In the cruise missile initiatives, the air launched cruise missile, we propose an addition of $50 million. Our original request was for $123.9 million. We are now asking for $173.9 million. Added to that, which was not in the original 1978 budget, is $103 million for the Tomahawk air launched cruise missile for the B–52; and $90 million for the cruise missile carrier. I will discuss all of this in a little bit of detail. Dr. Perry mentioned an additional $15 million for DARPA in cruise missile technology. There is also $9.9 million for an additional enhancement of cruise missiles that your staff has been briefed on. For cruise missile procurement, we propose $64 million. We had $40.6 million for early cruise missile procurement work on the ALCM. We have added an amount to have a competitive cruise missile procurement that we will describe. For the Defense Mapping Agency, for additional mapping work for the terrain correlation process for the cruise missile, we propose an additional $3.4 million.

AGM-86B ALCM

(RDT&E)

FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 123.9M
AMENDED REQUEST	$ 173.9M
DELTA	$ +50.0M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$200.0M	$173.9M	$139.6M	$29.9M	$543.4M

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
$120.0M	$120.0M	$120.0M

* AUTH CONF REDUCED ALL CRUISE MISSILE PROGRAMS (SLCM, GLCM, ALCM) BY $13.1M

This is the AGM–86B, so-called the "long ALCM." We have added $50 million there. On each of these charts like this, I will show the current status of the fiscal year 1978 congressional actions as I do here. We had asked for $123.9 million. The authorization conference left that at $120 million, and both the House and the Senate Appropriations Committees concurred in that amount. There was a reduction of $13.1 million in all cruise missile programs, and this reduction from $123.9 million to $120 million was the ALCM share of that reduction.

AGM-86B ALCM

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $123.9M

- COMPLETES AGM-86 A/B DESIGN
- STARTS AGM-86 A/B FLIGHT AND GROUND TEST MISSILE FABRICATION
- SUPPORTS DEC 80 AGM-86 B IOC / JUL 81 AGM-86 A IOC
- AGM-86 A INTERNAL TEST LAUNCH ONLY
- AGM-86 B EXTERNAL TEST LAUNCH ONLY ON SRAM PYLONS

PROPOSED ADDITION $ + 50M

- DESIGN, DEVELOP, FABRICATE AND DEMONSTRATE AGM - 86 B CRUISE MISSILE INTERNAL AND EXTERNAL CARRIAGE ON B-52
- DESIGN AND FABRICATE LAUNCHER AND PYLON
- RDT&E COMPETITION WITH AGM - 109 ON B - 52
- INSURES IOC OF FQ CY 1980

In each of the succeeding charts, I will talk a little bit about the current program, what is in it and what the additional money will do for us.

The current effort completes the design of both the A and the B models of the ALCM. As you know, the ALCM–A has been canceled and we are sticking with the ALCM–B. The current efforts also starts flight and ground test missile fabrication. It supports a December 1980 AGM–86B IOC, and a July 1981 AGM–86A IOC—initial operational capability.

The AGM–86A is internal test launch, and the AGM–86B is external test launch on SRAM pylons—both of these capabilities are important. We are now putting work in for internal carriage of the AGM–86B and for a specially designed pylon to enable carriage of more of the ALCM.

Senator McIntyre. Would you please pause for a question?

Mr. Smith. You said the ALCM–A has been canceled with the new program?

General Slay. Yes, sir.

Mr. Smith. Since the new program has not been authorized, I assume no stop work orders have been executed?

General Slay. Nothing has been done. What I perhaps should have said, Mr. Chairman, is that if the new amendment is approved.

Mr. Smith. It would be canceled—if the supplemental is approved?

General Slay. It would cancel the ALCM–A.

Mr. Smith. Thank you.

General Slay. The proposed addition would be to design, develop, fabricate, and demonstrate the B-model cruise missile for both internal and external carriage on the B–52; design and fabricate a launcher and pylon (not just use the old SRAM pylon); have a

competition with the Tomahawk on the B–52; and insure an IOC of first quarter calendar year 1980, in other words, March of 1980 for the initial operational capability.

ALCM

AGM - 86B BUDGET TRACK
($ TY MIL)

ITEM	78 BUDGET	AMENDED 78 BUDGET
DESIGN AND FABRICATION	76	99
B-52 CAE	12	15
SUPPORT EQUIPMENT	7	11
PYLON	0	9
LAUNCHER	0	9
SYSTEM TESTS	13	24
OTHER GOV'T	8	3
TECH REPORTS AND MANUALS	6	3
TRAINING AND PLANNING	2	1
TOTAL	$124M	$174M

This breaks the budget down into a little bit more detail. The first column shows the 1978 budget of roughly $124 million. You will notice that there were zero dollars proposed for the pylon and launcher. We have added amounts, as you see here. The zeroes are now $9 million for the pylon and $9 million for the external launcher.

You will notice also that tech reports and manuals have been reduced. Training and planning have been reduced, as well as other Government support equipment. The reason for these reductions is the proposed competition. We do not want to buy ground support gear, tech reports and manuals or have training and other planning work done until we know which contractor will win.

Senator GOLDWATER. General, you have a pylon and launcher?

General SLAY. Yes, sir.

Senator GOLDWATER. Now, the launcher will be out of the $50 million?

General SLAY. Yes, sir, and it will be a long SRAM rotary launcher.

Senator GOLDWATER. And could that be used with the B–111?

General SLAY. No, sir, it cannot.

Senator GOLDWATER. You have to use pylons on the B–111?

General SLAY. Yes; but there is also a proposal that General Dynamics has made. If one were to modify an FB–111 for this purpose, you could have up to 3 short ALCM's internally or 8 to 10 long ALCM's externally on the FB–111H. I have not looked at that at all. It is just a contractor brochure right now. I don't know whether that is feasible or not, but there is such a proposal floating around.

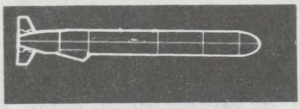
Senator GOLDWATER. You don't know yet what they are going to talk about in the way of costs?

General SLAY. We have it, again, sir, only in brochure form. We have had General Dynamics come in and give us a range of options that we are currently studying, on the FB–111H. We have not had AFSC put their chop on any of those dollar figures; they are strictly a contractor's estimate right now.

AGM 109 AIR LAUNCHED CRUISE MISSILE

(RDT&E)

AGM-109



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 0
AMENDED REQUEST	$ 103 M
DELTA	$ +103 M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$ 0	$ 103 M	$ 98.2 M	$ 28.2 M	$ 229.4 M

AGM-109 AIR LAUNCHED CRUISE MISSILE

(RDT & E)

FY 78 PROGRAM

CURRENT EFFORT $ 210 M (NAVY)

NAVY TOMAHAWK FULL SCALE DEVELOPMENT

DEVELOPMENT AND TEST OF SUBMARINE LAUNCHED CRUISE MISSILE FOR LAND ATTACK AND ANTI SHIP MISSIONS

PROPOSED ADDITION $ 103 M (AIR FORCE)

DESIGN, DEVELOP, FABRICATE, AND DEMONSTRATE AGM - 109 AIR LAUNCHED CRUISE MISSILE

INTERNAL AND EXTERNAL CARRIAGE ON B-52

DESIGN AND DEVELOP LAUNCHER AND PYLON

RDT&E COMPETITION WITH AGM - 86 B

INSURES IOC OF FQ CY 1980

On the Tomahawk, or the AGM–109, the original request, of course, was zero. There was about $210 million of Navy R.D.T. & E. in this line item, but the work was not associated with the air launched Tomahawk.

The amended request is for $103 million. Shown, of course, in fiscal year 1978, are $210 million for the Navy.

The proposed addition is to design, develop, fabricate and demonstrate the Tomahawk as a air launched cruise missile rather than as a subsurface or ship launched missile. For internal and external carriage on the B–52, it will use part of the $103 million to design and develop a launcher and pylon. Of course, the pylon, itself, except for minor differences should be the same as the pylon that will carry the ALCM.

We are not yet far enough into the design of the rotary launcher to know how much of a change or how much of a compromise will be needed. Obviously, if we could have a single design, it would be cheaper. Right now, it appears as though we might lose at least one missile in carriage capacity if we designed it for a combination of Tomahawk and ALCM. We are still in the early phases of studying what that internal launch mechanism should look like.

Senator GOLDWATER. Is the pylon designed to carry four launchers or a single launcher?

General SLAY. Six missiles per pylon.

Senator GOLDWATER. What is that going to do to the speed of your aircraft?

General SLAY. It won't cut the speed down from [deleted], Senator Goldwater, but it will increase the drag, naturally, and will cause more fuel consumption.

We are in the process of figuring profiles and tanker requirements for all of our B–52's, the D, G, and H models with these pylons hanging on them, to get to the H-hour control line as well as to the high GCI line.

It appears as though the tanker requirements will be about the same as they are on the penetrating force.

Senator GOLDWATER. Do you think you can maintain [deleted] with those things hanging on the wing?

General SLAY. I believe we can, sir. It is going to require a lot more push and the throttles are going to have to be up, but as far as that speed is concerned. I believe we can maintain that.

Mr. WALSH. At that altitude, you can probably maintain higher——

Senator GOLDWATER. I am talking about the low level phase.

General SLAY. At low level, I just don't know. I would hate to say; but at [deleted] feet the Q is pretty high. The dynamic pressure is pretty high at [deleted] the B–52. Whether we would reach the point of diminishing returns, we haven't figured out; at least I have not.

The point that Dr. Perry makes is that if we did penetrate with the B–52 after we had launched the long-range ALCM's, we would, of course, jettison the pylons.

I was trying to respond to the low altitude case. If we did go in at low altitude with the B–52, with pylons and missiles on, it would, of course, be very draggy. My comment pertained to getting to the

launch point. We would be at the high altitude optimum cruise for the B–52 then and I think we could maintain [deleted].

Senator GOLDWATER. I hope you will develop some figures on that.

General SLAY. I will, sir. I will get them to you.

Senator GOLDWATER. I have very strong doubts.

General SLAY. We will get them to you. We will develop them.

[The information follows:]

The current development program includes the development of jettison-able pylons. After cruise missile launch, the pylons could be jettisoned to reduced drag.

Concerning the speed and aircraft capability with and without missiles and pylons, the following information is provided. The B–52D, G, and H can maintain high altitude cruise Mach of [deleted] with and without missiles and with pylons only. The B–52D, G, and H can maintain low altitude cruise Mach of [deleted] with and without missiles and with pylons only.

Senator MCINTYRE. What would the cockpit of the B–52 look like flying at [deleted] off the ground with these pylons designed—what is it going to be like in the cockpit?

General SLAY. The pilot is going to have his view blanked out. He is going to have flash curtains. It is kind of scary at [deleted] feet. Not really, sir. But for nuclear blast, blindness protection, the thought is that you use the radar on board the B–52 plus the viewing systems with FLIR and low-light TV. You will have a scope there for those systems but you are strictly flying under the hood. You have got a hood up and the panels of your windscreen and side windows are blacked out when you are flying down at that low level.

Senator MCINTYRE. Do you get a smooth ride?

General SLAY. Pretty rough.

Senator MCINTYRE. It is a terrible ride, isn't it? During the B–1 controversy, they brought a film over to the House. I tell you, these films impressed this amateur. They showed what a low level ride looks like in a B–52. I once had a ride in a small plane; that was mild compared to what they were going through. They also showed a B–1; it was like you were riding on one of our commercial jets.

General SLAY. Sir, if you ever have the opportunity to ride in an FB–111 from up in your home State, you ought to. As a matter of fact, I prefer to be under the hood. I really do, because just natural pilot reaction is to kind of shrink away from the hill coming up at you, because it doesn't look like you are going to make it over the top. Whereas, it isn't so bad if you come up to the hill like that when you are under the hood. You can also fly on autopilot, and you keep your throttles moving forward to keep your speed up. The autopilot pushes you over the top and down the other side. That is when it gets really uncomfortable. The dust and debris in the cockpit floats up around your eyeballs. It is not a comfortable ride, particularly if you have it on the hard setting.

Senator GOLDWATER. It took me 3 months to quit being chicken.

General SLAY. It took me more than that.

Anyhow, the chart shows what we will use the proposed addition for. It will insure IC in the first quarter of the calendar year 1980, the same as for the ALCM–B.

AGM-109 AIR LAUNCHED CRUISE MISSILE (RDT&E)

FY 78 + $103M PROGRAM

AIRFRAME		48.1M
DESIGN	($8.5M)	
VEHICLE FABRICATION	($13.5M)	
EARLY DEMONSTRATION LAUNCH	($0.5M)	
TESTING	($5.4M)	
GROUND SUPPORT EQUIPMENT	($8.8M)	
SUPPORT (INTEGRATED LOGISTICS SYSTEM, TRAINING, TECH MAN)	($9.2M)	
CARRIER AIRCRAFT EQUIPMENT MODS (DESIGN & MOD) - INTERNAL RACK	($2.2M)	
GUIDANCE		23.8
ENGINES		14.2
GOV'T COST		16.9
TOTAL		$103.0M

These are the items on which we will spend the money.

Vehicle fabrication and design equates to about $22 million. Early demonstration launch, which is with a missile that Captain Locke has already in procurement, requires half a million dollars; testing, $5.4 million; ground support equipment, another $9 million; and carrier aircraft equipment mods, that is, design and modification for the internal rack, about $2.2 million. This is only in the 1978 program; $103 million total for that program.

Senator GOLDWATER. You had engines in there. We have heard talk that you are going to re-engine the B–52. If that is so, what are you going to re-engine it with?

General SLAY. No, sir; We have looked at re-engining the B–52. As you know, the D-model engine has 1,600 pounds less thrust less than the G model. It is an older model engine than the one we have on the G model. We have looked at whether or not we should re-engine particularly the D models because of the expense. Senator Goldwater, we have just never been able to bite that bullet. We don't have any money in what you see here for B–52 engines R. & D.

Senator GOLDWATER. Are they still making that engine?

General SLAY. No, sir; they are not.

Senator GOLDWATER. How are you going to keep those airplanes flying another 10 years with these old, old engines?

General SLAY. Sir, the G and H force have newer engines, as you know, and they are supportable. We have enough spares for the D models, from discards from other programs, that we can keep those D models operating.

Senator GOLDWATER. How many hours do you get off——

General SLAY. I don't know, but I can certainly provide that at the same time I provide you the other.

Senator GOLDWATER. You get the time on the old engine; I don't think you get all the time you get off the newer engines.

General SLAY. No, sir. I can say that without looking it up. It is less, but we will give you the exact figures.

[The information follows:]

Currently the engines used on the B–52D, G, and H are on a 4,000 hour time between overhaul (TBO) schedule. We anticipate no difficulty supporting the engines on the B–52's over the foreseeable future.

FLY – OFF CONSIDERATIONS

LIFE CYCLE COSTS

EVALUATE SYSTEM PERFORMANCE

- RANGE
- SPEED
- TERRAIN FOLLOWING
- CEP
- MANEUVERABILITY
- SURVIVABILITY
- OBSERVABLES

DEMONSTRATE COMPATIBILITY ON B-52

EVALUATE IMPACT TO B-52

DEMONSTRATE COMPATIBILITY WITH SAC CONCEPT OF MAINTENANCE AND OPERATIONS

DEMONSTRATE CARRIAGE AND LAUNCH THROUGHOUT THE SAC OPERATIONAL ENVELOPE (IOT&E)

General SLAY. There are fly-off considerations, I am not showing these to infer that this is what Captain Locke will eventually come up with as criteria to determine who wins. These are just things that we know will be considered. There is no priority order to these. That will have to be in the request for proposal. Naturally, the life cycle cost is going to be very high in our consideration. System performance—range, speed, ability to terrain follow, the circular error probable that is attainable, how maneuverable the missile is, the survivability of the missile, the observables—all of these will be considered in evaluating performance. Its compatibility with the B–52 must be demonstrated and the impact as far as modifications required to the B–52 must be evaluated. Compatibility with the SAC concept of maintenance and operations will be considered. We will, of course, demonstrate carriage and launch throughout the SAC operational envelope. I think this is very important. We intend to do initial operational test and evaluation of these two missiles before we make the selection, so that this will be part and parcel of the source selection procedure.

As a matter of fact, almost three-quarters of the total launches before the end of competition will be operational-type launches rather than R. & D.-type launches.

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AGM-86B/AGM-109 ALCM

(PROCUREMENT)

FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 40.6M
AMENDED REQUEST	$ 104.6M
DELTA	$+64.0M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$0	$104.6M	$139.1	$2157.3	$2401.0

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
$40.6	$20.3	$40.6

Procurement. We had $40.6 million requested originally. We have added $64 million, principally for the competitive part of the procurement.

AGM86-B/AGM 109

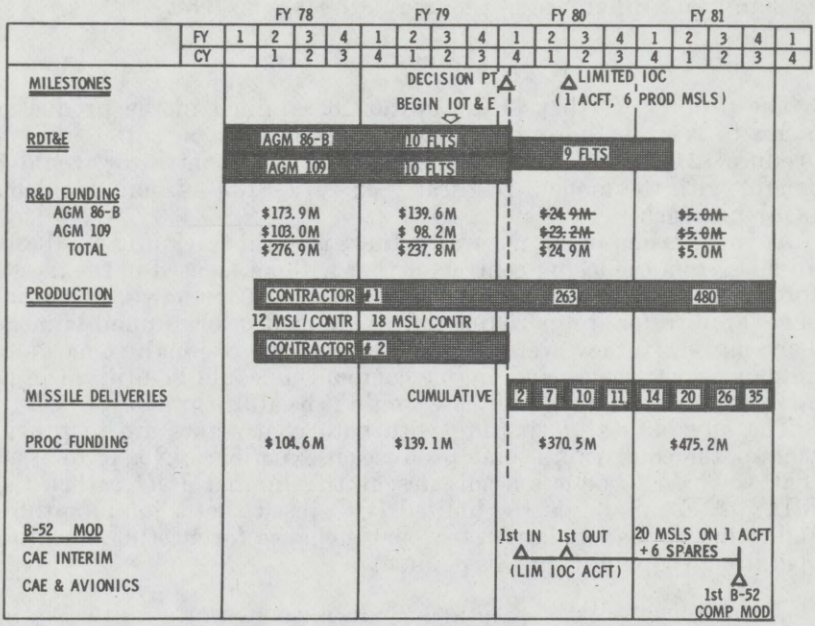
(PROCUREMENT)

	ORIGINAL BUDGET	AMENDED BUDGET
PRODUCTION/ENGINEERING MGT	$10.6M	$14.4M
PRECISION FORGINGS	8.5	1.7
SUBCONTRACTS/MATERIALS	11.5	28.9
TOOLING	10.0	5.9
MISSILE ASSEMBLY/INTEGRATION	0.0	53.7
	$40.6M	$104.6M

This shows where we were spending the money in our original budget. You will notice that we were concentrating on getting precision forgings here and tooling up. In pulling the second contractor in for a competitive program, we have decided not to go with the precision forgings heavily, nor with the tooling heavily, in order to save money in the long term.

We would actually, of course, do this after we determined which contractor is the winner. But it wouldn't make sense to spend all of that money in a competitive environment.

CRUISE MISSILE PROGRAM



This is perhaps the most important chart that I will discuss with you today. This is complicated but I will try to walk through the whole thing with you. This is the cruise missile program in a nutshell, on a single chart.

What we are saying, Mr. Chairman, is that we want to start R.D.T. & E. on the long AGM–86B ALCM and the Tomahawk, and we want to have eventually 10 flights of each of these missiles in the fly-off phase.

We would start initial operational test and evaluation here in the second quarter of calendar year 1979—that is, in June of 1979; the third quarter in fiscal year 1979. The latter 7 flights of each of those 10 flights by the 2 contractors would be under operational conditions with SAC crews; so that latter portion is strictly I.O.T. & E.

Nine flights would be made subsequent to the selection of the contractor, which would be here at this point [indicating]. That is the decision point on the contractor. We are pushing for a limited IOC, initial operational capability, with one aircraft and six production missiles, here in March of 1980.

I will now drop down to the funding profile for R. & D. before I get into the production.

These are the items that you have seen before on the preceding charts for fiscal year 1978, $174 million for the AGM–86B, which is the long ALCM, and $103 million for the Tomahawk; for fiscal year 1979 that drops to $140 million for the ALCM and $98 million for the Tomahawk. You will notice I have both of the fiscal year 1980 estimates marked through. If we continue with the AGM–86B, the first number marked through is your funding profile for the next 2 years. If you continue with the Tomahawk, the second number marked through is the funding profile.

The AGM–86B is the higher of the two in fiscal year 1980. There is no significant difference in the two in fiscal year 1981.

PRODUCTION

The proposal is that $104.6 million be applied in the production phase to start both contractors with production on soft tooling to produce 12 missiles. Twelve missiles from each contractor would be bought with the money. In fiscal year 1979, $139 million would buy 18 missiles each.

At the decision point, naturally, there is in this rack up a total of 30 missiles from the losing contractor that will not be used in the tactical force. However, example, if the loser were the Tomahawk, they would have application to perhaps the sea-launched or ground-launched Tomahawk. If they were ALCM's that were residual, some of the guidance components and engine components could be utilized in the other missiles. So in neither case would it be all throwaway.

The advantages of starting with both contractors are to provide each of the contractors some production experience, No. 1; to assure that we have production missiles at the limited IOC rather than R.D.T. & E. missiles at the limited IOC, just to get a jump on things and to insure that we have a reasonable chance for meeting our initial operational capability at this point.

MISSILE DELIVERIES

Delivery of the full production missiles, all up production missiles, would start with two in the fourth quarter of calendar year 1979. We would have seven missiles delivered by the end of the first quarter of calendar year 1980, before initial operational capability date, and would build up rather slowly in later quarters. The delivery schedule is by quarters. The funding profile is for fiscal year 1980 and fiscal year 1981.

As far as the B–52 modifications to go along with that (CAE means carrier aircraft equipment), that is, the equipment to enable the B–52 to carry and launch the ALCM, we have an interim configuration for just enough aircraft to do the initial IOC job. The thought is that the eventual configuration which would include the upgraded avionics program that we currently have working and are expediting. The first B–52 with the full modification would be delivered in the middle of calendar year 1981.

We would have 20 missiles on one aircraft plus six spares at that time if that buildup were continued.

I want to make it clear that the interim mod includes only those modifications necessary to enable the B–52 to carry and launch the ALCM. The final mod will include the complete upgrade of the B–52 with the avionics modifications that we have planned.

That is, as I said, a complicated chart. I am sure there will be questions here, if the chairman would have any.

Senator McIntyre. Does that conclude——

General Slay. No, sir, I have additional charts. I wanted to be sure this chart was understood.

Senator McIntyre. That is the first time we have seen that chart?

General SLAY. It is. It is a complicated program, the way it is laid out, but it gets to the heart of all of the aspects of our program.

Senator MCINTYRE. Who are the two competitors here?

General SLAY. It will be General Dynamics for the Tomahawk and Boeing for the ALCM. The thought is that two B–52's would be given for modification to Boeing, two B–52's to General Dynamics for modification, to enable them to carry the cruise missile.

These are B–52G's. The flyoff will begin about this point. Initial operational test and evaluation will begin in the third quarter of fiscal year 1979. A decision on who is the winner will be made in the first quarter of fiscal year 1980.

Senator MCINTYRE. Will you say it again for me? If everything goes successfully on your competitive program, what will we have down in the right-hand corner, the low corner? That is the third quarter of fiscal year 1981 we would have the first B–52 with a complete mod. How many missiles would we have?

General SLAY. Twenty missiles plus six spares at that time.

Senator MCINTYRE. With one aircraft ready to fly for——

General SLAY. Completely tactically configured. We will have an early capability back here as this point in March of 1980. You would have six production missiles and one B–52 modified with the cruise missile gear, but not modified with the upgraded avionics equipment.

The full avionics mod will start to come out at this point [indicating].

Mr. Chairman, I should stress that these avionics mods pre-date the ALCM/B–1 decision. These mods are modifications that we need on the B–52 for upgrading its capability and for maintainability and reliability purposes. This is not a new program. All we are doing is moving things up about a year on that modification. That is all we are doing. The B–52 avionics are quite old. We are having problems maintaining them. We want to modify and upgrade both the offensive and defensive avionics.

Senator MCINTYRE. It just occurs to me if everything goes well, and you select a winner of the competition, the losing competitor will probably want to get into the act, because you are going to go hell-bent for election to make these missiles operational and get these planes equipped. It looks to me like it is mid-1985 before we have replaced what we thought we were going to replace with the B–1.

General SLAY. Yes, sir, a normal modification pace would be perhaps three a month on B–52G aircraft mods. Depending on how many you want to modify, if you divide that by three a month, that is how long it would take to modify the force.

Senator MCINTYRE. So you have the B–52 in the mideighties, 1985, will it be replaced then? Will those B–52's be going for the next 10 years, into the 1990's?

General SLAY. We have always said the B–52 would be retained in our force through the [deleted]. We have not made any long-range projection beyond that. We are in the process of attempting to do that right now. There are implications on structure; there are implications, as Senator Goldwater mentioned, on engines; and there are implications on penetrativity.

As Dr. Perry pointed out when he was here the day before yesterday, the intelligence projections for the late 1980's are such that we know

that the job is going to get tougher. We don't know how tough that job is going to be. We are in the process of trying to study that and make those projections as to how long this B–52, No. 1, can last, and No. 2, how long it can penetrate with a reasonable degree of assurance that it will be successful in the penetration mode.

As long as we had the B–1 in the wings, we just had not projected the B–52 beyond the late 1980's. We must do that and we are doing that now.

Senator GOLDWATER. I want to go past that chart. Has the Strategic Air Command figured out on their target an estimate as to how many missiles they are going to have to buy?

General SLAY. No, sir. I have done that in an off the top of the head fashion. As I showed you the other day, just pure guess on my part, and with no detailed analysis of ALCM penetration, I have estimated somewhere between [deleted] bomber weapons as a requirement.

Depending upon what attrition factors one would want to apply, you might have on the high side [deleted]. Just as an arbitrary figure I pulled right out of the air for the purpose of illustration, as Mr. Smith asked that I do, [deleted] total weapons.

Senator, that was done in one night and two days, if that will calibrate it for you. I am not saying that is a good estimate. It is just the best I could do in the time that we had to do it.

Senator GOLDWATER. Do you think General Ellis, by the 24th will have a little tighter figure on that?

General SLAY. Sir, beyond a shadow of a doubt. We are working that problem hard right now with General Welch and his studies and analysis group. That data will be bundled up and taken to General Ellis to be ground into the SAC estimate which they are doing, to attempt to come up with a better calibrated figure when he is here in August.

Dr. PERRY. Could I make an additional comment on that?

Senator GOLDWATER. Yes.

Dr. PERRY. In the various cost/effectiveness analyses/studies we also looked at a range of numbers that might be used for the cruise missiles. In that range we were looking at a minimum of about [deleted] going up to an expected number of about [deleted]. It is a time-dependent variable; it depends on the ability of the penetrating B–52 to penetrate. Early in the 1980's, the higher percentage of B–52's will be used for penetrating. Later in the 1980's a lower percentage will be used. We expect the requirement for cruise missiles to be lower in the early part of the 1980's and higher in the later part of the 1980's, so any given number has to be identified with the time at which the force is going to be operating. We have used numbers as low as [deleted] would only apply to the very early part of the 1980's.

Senator GOLDWATER. Thank you.

Senator SCHMITT. Could I ask, on that preceding chart, do you have a running R. & D. cost? Have you run out R. & D. cost on the two?

General SLAY. The next chart.

Senator SCHMITT. Also, where in this, if any, is there a continued look at the advanced, late 1980's–1990's, manned bomber system to replace the B–52? That is something we are not even talking about at the present time?

General SLAY. No, sir, we are talking about it. As a matter of fact, today in my office, we just received some data from General Dynamics on a program to take two crash-damaged FB–111's and stretch them so that they can carry more fuel and more weapons, and modify them as necessary with the wheels, tires, and brakes, to accommodate that.

It involves a different arrangement on the landing gear to increase the size of the weapon bay, and stretching the fuselage, in order to have two prototype FB–111H's. In other words, a stretched FB–111. That has not gotten out of my office. I am due to go up to the Chief with it this weekend. If he doesn't throw me out of the office, we will try to push that down to Dr. Perry sometime within the next week or 10 days.

Senator SCHMITT. What about designing a new bomber system?

General SLAY. That is not at all in our planning stage at this time.

Senator SCHMITT. Thank you.

Mr. SMITH. General, could you put the last chart on for a moment?

General SLAY. Put the last chart back up.

INITIAL OPERATIONAL CAPABILITY

Mr. SMITH. What does the term "limited IOC aircraft" mean, and what does the term "limited IOC" of the cruise missile mean?

General SLAY. I think it would be cheeky of me to claim that six missiles and one airplane is an initial operational capability. The "limited" is to make sure that this committee understands exactly what they are getting in March 1980. It is limited.

Mr. SMITH. Why do we call it operational capability then?

General SLAY. Because it is an operational capability with one airplane.

Mr. SMITH. One could take the six production missiles and operate them?

General SLAY. That is correct.

Mr. SMITH. Are there other definitions commonly used in the Department of Defense for the term "IOC"?

General SLAY. Mr. Smith, there are several.

Mr. SMITH. What are some of them?

General SLAY. It depends on the time of day and the temperature of the water when the program is laid down as to what you define as IOC. JCS has a definition.

Mr. SMITH. What is their definition?

General SLAY. General Haig has a definition. We have a definition.

Mr. SMITH. What is JCS's definition of IOC?

General SLAY. Again, it depends on the weapon system. As a fighter, I think if you can have a squadron of fighters fully equipped and be able to support operations with enough spares and gear for a certain period of time—I believe 10 days—then you have an IOC, but it is a very finite definition.

We had a definition on the B–1, as you recall, of the operational capability date as 65 aircraft in operation, but that was purely arbitrary.

Mr. SMITH. What was that date under the plan? When is the comparable IOC, in that, sense of the cruise missile force on B–52's?

General SLAY. October 1982.

Mr. SMITH. October 1982. What would be the comparable IOC for this kind of a force on the B–52 using the same definition of "O" in the IOC?

General SLAY. It would be in 1982. You would have delivered a sufficient number of missiles and you would have B–52's coming off the modification line at a rate of three per month, so we would have a wing's worth modified by 1982. Again, it would be one initial operational capability date but with more airplanes. We normally define a fighter IOC as around a squadron's worth of fighters which, depending upon the force structure, would be 18 or 24. It is not a scientific term that covers everything across the board. It has been different on different categories of weapons. We have always used limited IOC's when there is an interim milestone when we have the first capability of participating in the SIOP.

Mr. OLD. General Slay, wouldn't a SAC IOC be dependent upon when the force could assume a portion of the SIOP commitment?

General SLAY. That is correct. That is cranked in the full IOC date.

Mr. OLD. So when you say a squadron would be equipped and ready in 1982, that is when that force would have a SIOP commitment?

General SLAY. Yes. But the point is that, say this were at K. I. Sawyer, SAC says that in March 1980 one aircraft will be capable of launching the ALCM. While it is up and in commission, with six missiles attached in some fashion you have a limited IOC. That aircraft might have [deleted].

CURRENT MODIFICATION PLANNING

Senator GOLDWATER. How many B–52's are you talking about, 75 D's?

General SLAY. No, sir. I used a force the other day, just for illustrative purposes, of a penetrating forces of [deleted] with no modes for the ALCM. Again purely illustratively, Senator, I added to that enough B–52G's to take up all of our existing SRAM assets, which includes [deleted]. That is totally unscientific but Mr. Smith wanted an illustrative force split between penetrators and cruise missiles. In order to have some rationale upon which to hang my hat, I just picked those arbitrarily as something to figure a force around.

The remaining B–52's: There were [deleted] that were in the standoff force. That was the force that was postulated. I want to stress very, very much, Senator, that this may bear absolutely no resemblance to a force that might eventually be fielded. Again, I was responding to a specific request, on short notice, to develop something to show this subcommittee as an illustrative force and to try to put that force against the target structure that might be anticipated in the mideighties.

Senator GOLDWATER. So we are looking then at something between 6 and 8 years after you start modification before we have a SAC force that would be comparable to what we have today?

General SLAY. Sir, that could be speeded up. I used the three per month as the normal rate for putting out B–52G's on the PDM cycle program, depot maintenance cycle. We are looking at what, on this program, really makes sense on a production line, be it at Kelly,

Tinker, or perhaps a speedline mode at Boeing Wichita. We haven't made up our minds yet where that would be. It might be all three. If it is all three, even at a reasonable rate we could put out 10 per month.

Senator GOLDWATER. Tinker is the only place that is doing mod, isn't it?

General SLAY. Kelly.

Senator GOLDWATER. Kelly is still at it?

General SLAY. Yes sir, they are still doing it. Kelly and Tinker.

Senator GOLDWATER. My concern is when will we have SAC ready to be able to answer any challenge in the way we would like to answer it?

General SLAY. With cruise missiles?

Senator GOLDWATER. Yes.

General SLAY. Let me offer, Senator, that rather than give you a top of the head answer, when I provide you with the other information, we will give you a range of options as: "What if?" What if we do it only at Tinker, what if we do it at Tinker plus Kelly, or Tinker plus Kelly plus Wichita? I will give you that. We can do that very easily, sir.

Senator GOLDWATER. I think it is very important for us to know and the Congress to know because it is going to have a bearing on SALT.

General SLAY. Yes, sir.

Senator GOLDWATER. It is going to have a bearing on strategic plans. We are going to have a period where we are going to be kind of naked. I would like to know how long that is going to be.

General SLAY. We will provide that, Senator.

The current modification planning provides a cruise missile capability in three phases. First, a limited operational capability (LOC) can be obtained in early 1980 by converting RDT&E assets. Second, an interim capability can be obtained by minor modifications to the B–52G. The number of aircraft modified would be determined by the number of production missiles available. The production missiles would not be available immediately because of a fly-off, a missile selection process and production lead times. This period would last from March 1980 until June 1981. The number of interim carriers varies according to the number of production missiles available divided by missiles carried, either [deleted] each.

The third phase will begin in [deleted]. By this date the complete avionics package will be available to be incorporated with missile carriage to produce an initial operational capability. Using the periodic depot maintenance (PDM) cycle to modify the aircraft, the program would be completed in FY [deleted]. Approximately [deleted] B–52G aircraft are entered into the PDM cycle, annually. This is the normal flow number and therefore would not impact aircraft alert rates. This schedule would produce the [deleted] aircraft in [deleted]. An acceleration of this rate is possible [deleted].

With acceleration, the yearly output could be doubled with the [deleted] aircraft available in deleted with estimated completion in [deleted].

Dr. PERRY. I would like to comment that I don't see a period of nakedness. Our SAC B–52 penetrating force will continue to be operational. We have no plans to draw down on that force. The question is how quickly we phase in cruise missiles to replace penetrating forces. At any given point in history, for example 1982, we will still have the total number of B–52 bombers operational. Some percentage of them will be penetrating bombers and some percentage will have cruise missiles. [Deleted.]

Senator SCHMITT. That is our desirable date?

Dr. PERRY. Yes.

Senator McIntyre. Is it likely, Dr. Perry, that next year, 1979, you will be looking at this FB–111 stretch?

Dr. Perry. I expect to be looking at the Air Force proposal for the FB–111 stretch within the next few weeks.

Senator McIntyre. The next few weeks?

Dr. Perry. Yes, sir, General Jones has kept me informed of the study as it is progressing and we are prepared to receive that. I have discussed it with Secretary Brown. He is aware that the Air Force is putting this proposal together, he has encouraged them to proceed on it, but with no commitment as to accepting it or not accepting until we see the form of the proposal.

Senator Schmitt. I apologize for interrupting. I appreciate the opportunity to visit with you today.

I certainly hope that the subcommittee will continue to look at the desirability of a design study effort at any rate of the kind of manned strategic bomber system that would give us flexibility and continued continuity of design out into the remainder of this century. I don't think a stretched FB–111 is that kind of a system. It might be something we should look at and should maybe even commit to an interim response, but when we talk about the rest of this century, for a manned portion of the triad system I think we are looking at another design effort, one that learns from the mistakes of the B–1 in terms of cost and maybe of design, but one which provides us with an option somewhere in the future.

These B–52's, I guess the newest are going to be 20 years old in 1980, and they are going to be under tremendous training pressure. If you are going to train these crews to use them and get down to low altitudes it is going to be awfully hard on them. I think this subcommittee should encourage that kind of an effort.

Senator McIntyre. I think that Defense will keep alive a manned bomber program until such time as it appears the cruise missile is going to be a successful penetrator, the weapon we hope it will be, but, the present plan, I believe, am I right, the B–1 program will be kept up in the R. & D. up through No. 5 with all the testing going on?

Dr. Perry. The present plan is through No. 4. We will complete the construction of unit No. 4 in the B–1 and continue the tests on the B–1 through 3.

Senator McIntyre. That will extend over another year?

Dr. Perry. That will extend over probably several years.

Senator Schmitt. What is the focus, if I may ask, of that R. & D. quote unquote program? Is it to try to learn how to design another bomber system or is it to learn how to use cruise missile systems, or manned systems in general, or what?

Dr. Perry. Its focus is to maintain a capability for a manned penetrating bomber, and the B–1 is our present best option for doing that. The FB–111H would be an option to doing that.

Getting to your point of looking into the 1990's and beyond, we will be conducting design studies and analyses to determine whether a penetrating manned bomber will be desirable in the period 1990 and beyond. If our studies indicate that is desirable, there would be a proposal to develop such a bomber to come into the force in the 1990's.

As it stands now, we don't have any basis for predicting that a manned bomber will be required in the 1990's and beyond that period. but we are not foreclosing that option.

Senator SCHMITT. I surely hope that you will not. The basic argument for the manned bomber, I think, remains constant at whatever time period you look at it, unless Soviet or other potential adversaries defense measures become completely dominant. I don't expect that they will.

Dr. PERRY. The issue is only whether the manned bombers may have to penetrate or whether the penetration can be done better by bombers delivering weapons from offshore.

Senator SCHMITT. Well, the penetrability of a manned weapon system is still something that is desirable politically. It still is recallable. The farther you get away from your target the longer period of time where the commitment has been made and there is no recourse and the manned bomber's system's greatest attributes, I think, are the political attributes.

One, you don't commit them until the last moment, and you always have that option of recall. Once you launched at least the modern cruise missile, present cruise missiles and the ballistic systems you have committed yourself.

Dr. PERRY. I would submit that the point you make is a very important point. It is the primary reason for keeping the manned bomber force in the triad.

It seems to me that the manned bomber delivering cruise missiles from offshore retains the principal desirable features. Namely, you can launch them from the air bases, get them out of the vulnerable spots on the ground, you have on the order of [deleted].

From the point of the [deleted] when you launch the missile, then indeed the missiles are not recallable. If you were to compare that to a penetrating bomber, by the time the penetrating bomber reaches the [deleted].

So I agree with your point completely, but I submit that the cruise missile carrier has those same characteristics to a very close approximation.

Mr. SMITH. General Slay, in your testimony before the subcommittee on bomber weaponization hearings, I recall you defined the last point when a typical bomber sortie can be recalled in the current SIOP.

MANNED BOMBER RECALL

What is that point that a manned bomber can be recalled currently in the SIOP? When is the point of no return?

General SLAY. [Deleted.]

Mr. SMITH. Typically what would that translate in terms of the dialog here?

General SLAY. It depends upon the availability of the tanker and fuel, Mr. Smith. [Deleted.]

Mr. SMITH. So in the current force what would be the typical break point.

General SLAY. If I can be permitted to give you a top of the head guess and correct it for the record, [deleted.]

[The information follows:]

Bomber recall: [Deleted.]

Mr. SMITH. [Deleted.]

General SLAY. [Deleted.]

Mr. SMITH. I see. So you have got the flight to that point, which is [deleted].

General SLAY. That is correct. That is assuming availability of a tanker. Mr. Smith, I have to tell you that I am going to calibrate that. I pulled that out of the air just from recollection.

Mr. SMITH. I understand. Now, just to nail down the point though, how would that have changed with the B–1? Would there have been any substantial change in the current recallability of the manned bomber with the B–1 in the force?

General SLAY. No.

Mr. SMITH. Now, would that same set of assumptions apply to a B–52 armed with a long range cruise missile?

General SLAY. If he has 20 cruise missiles on board, 12 externally plus pylons, his drag is higher, and he is going to have to have a little extra power in order to keep his alpha or angle of attack from getting away from him. He will also have to have a higher throttle setting on orbit to overcome the drag. So his time on station is reduced. I cannot quantify that. It is based upon my many years of flying airplanes around. I know it is going to be reduced. I will attempt to quantify that for you.

Mr. SMITH. That would be very helpful. It would bear exactly on the point of this discussion.

[The information follows:]

The time on station is based on conditions existing and each situation. Three hypothetical cases have been developed to compare bomber loiter capability. The following example is based on: standard day conditions, cruise at [deleted]. Three cases are: (1) loiter in orbit area, proceed to launch point, launch missile payload, jettison pylons, and return; (2) loiter in orbit area and return with missile payload and pylons; and (3) loiter in orbit area, proceed to launch point, launch missile payload, retain pylons, and return. Distance to loiter point used is 3600 NM.

	Time on station—Cases		
Aircraft	1	2	3
B–52G [Deleted.]	[Deleted.]		

General SLAY. But they do have a considerable amount of time. In that case, if he is going to launch his cruise missiles, then he does have the added time of flight from point A to point B, which is his first target. He would launch his missiles and then proceed [deleted].

Mr. SMITH. You could buy back whatever reduction in recallability with more tankers, though, if you wanted to spend the money?

General SLAY. Yes, sir, there has been a considerable amount of commentary about the cruise missile force eliminating the need for tankers. In my personal opinion, that is hogwash.

Senator MCINTYRE. OK, let's go.

CRUISE MISSILES PROGRAM COMPARISON

	FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
OLD PROGRAM					
RDT&E	$200.0M	$123.9M	$ 86.2M	$ 78.6M	$ 488.7M
PROCUREMENT	0	40.6	258.4	2064.5	2363.5
A/C CAE MODS	0	7.1	22.7	97.2	127.0
TOTAL	$200.0M	$171.6M	$ 367.3M	$2240.3M	$2979.2M
NEW PROGRAM COMPETITIVE AGM 86/AGM 109					
RDT&E					
ALCM B	$200.0M	$173.9M	$ 139.6M	$ 29.9M	$ 543.4M
TALCM	0	103	98.2	28.2	229.4
TOTAL	$200.0M	$276.9M	$ 237.8M	$ 58.1M	$ 772.8M
PROCUREMENT	0	104.6	139.1	2157.3	2401.0
A/C CAE MODS	0	7.1	10.0	120.1	137.2
TOTAL	0	$111.7M	$ 149.1M	$2277.4M	$2538.2M
TOTAL (RDT&E AND PROCUREMENT)	$200.0M	$388.6M	$ 386.9M	$2335.5M	$3311.0M

REMARKS

- RDT&E
  - FABRICATE 20 MISSILES
  - CONDUCT 26 FLIGHTS
- PROCUREMENT
  - JUN 80 IOC
  - FABRICATE 2328 MISSILES

- RDT&E
  - FABRICATE 28 MISSILES
  - CONDUCT 29 FLIGHTS
  - 4 TEST AIRCRAFT
  - NEW SIX CARRY PYLON
  - NEW STRETCHED ROTARY LAUNCHER
- PROCUREMENT
  - MAR 80 LIMITED IOC
  - FABRICATE [deleted] MISSILES

NOTE: AVERAGE PROGRAM UNIT COST [deleted] MISSILE BUY: $ 1,340M
ADDED [deleted] MISSILE BUY
MARGINAL UNIT COST: $ .942M

General SLAY. I have here, Mr. Chairman, a cruise missile program comparison, the old program as it existed in the 1978 budget and the new program which calls for a competition between the AGM–86 and AGM–109. This is for a total buy of [deleted] missiles. That would be for the R.D.T. & E. in the old program, about $489 million, procurement, about $2.4 billion. The carrier aircraft equipment modes to enable the aircraft to carry the ALCM cost another $127 million for a total of $2.98 billion for the old program. That would have equipped the B–52 and the B–1 force with a total of [deleted] cruise missiles, carried in combination, internally and externally, with internal missiles being the short range, short ALCM–A.

The new competitive program which I have just outlined on the previous chart, for the same number of missiles, that is, [deleted] would cost about $3.31 billion for the total program, including R.D.T. & E. and procurement. That includes the fly-off competition between the ALCM–B and Tomahawk air launched cruise missiles and procurement of the same number of missiles. For comparison purposes, on an apples and apples comparison, you have $2.98 billion for the old program and $3.31 billion for the new program with the competition.

As I indicated in my illustrative example for you, Senator Schmitt, if we want to add [deleted] missiles to that, the incremental cost, on, as I call it marginal unit cost of the last [deleted] that you would buy is $942,000 apiece. That would compare to an average unit cost of the [deleted] missiles of $1.34 million. All that says is that I am taking this program as a given. In these [deleted] missiles we are amortizing all of our nonrecurring expense and all of the R.D.T. & E., et cetera. That cost us $1.34 million average per missile.

Now, if we say we want to continue beyond this sunk money, each missile will cost an additional $942,000.

The R.D.T. & E. program included to refresh your memory, 28 missiles fabricated; 29 test flights conducted; and 4 B–52's modified, 2 for Tomahawk carriage and 2 for ALCM carriage. It will also buy a new six carry pylon and a new stretched rotary launcher whose dimensions will depend upon how we decide to make it: Whether we make a single launcher to encompass both the ALCM and Tomahawk, or whether we design separate rotary launchers. March 1980 is the limited IOC. Total fabrication is [deleted] missiles in this program that you see here.

Mr. OLD. General Slay, you mentioned a new stretched rotary launcher. Is there also a plan to build the stack rack launcher?

General SLAY. For Tomahawk, that is a potential, yes.

Mr. OLD. Yes, sir, is the cost of that in your figure?

General SLAY. No; that would probably be less expensive, however, Captain Locke might want to address this. I would think it might be less expensive than the rotary launcher.

Mr. OLD. We were told that in the competition there would be a rotary rack development, both a stretch and a stack rack.

General SLAY. Captain, do you want to address that?

Captain LOCKE. General Dynamics is planning to demonstrate that. Of course we really won't know until we see their proposal.

Mr. OLD. Who is going to pay for it?

Captain LOCKE. It would be paid for out of this. The stack rack is not that expensive. These are conservative estimates and I would expect in a competitive environment that the contractors will come in within this R. & D. estimate.

Mr. OLD. But is the cost of that rack in these projected costs?

Captain LOCKE. The brochure quality costs that we got from General Dynamics included a stack rack. So the answer is yes.

General SLAY. The point I should make is the reason that we have costed the stretched rotary launcher. If we decide to go to stack rack, it would be encompassed with the funds that we have for the stretched launcher.

Again, I have to state that we have not yet come down on the design for that rotary launcher. I have enough money in here to cover any eventuality in order to do that, we have taken the expensive route, which is a rotary launcher designed for Tomahawk and a rotary launcher designed for ALCM. If we go to a single rotary launcher, it is going to be cheaper. If we go to a rotary launcher for ALCM and a stack rack for the Tomahawk, it will probably be cheaper. I guess that is the best I can do on that.

Mr. OLD. Well, you have, Captain Locke, $103 million requested in fiscal year 1978 for the AGM–109, and you are telling me that that includes all the costs required for TALCM plus development of this stack rack, is that correct?

Captain LOCKE. Yes, sir.

Mr. OLD. I understand that the General Dynamics people don't want to use the rotary launcher, they prefer the stack rack launcher.

Captain LOCKE. Well, that may be. We will see what they submit in their proposal.

Mr. OLD. Well——

Captain LOCKE. There are other considerations. With the rotary rack, one still can maintain SRAM capability. General Dynamics may decide it is best to propose both.

Mr. OLD. Each competitor, however, gets not only to propose his missile, he also gets to propose what rack he wants his missile ejected from?

Captain LOCKE. Yes, sir. In the past competitions we have run, we have noted the contractors usually hedge themselves and propose dual ways of doing things.

Mr. OLD. Thank you, Mr. Chairman.

Senator MCINTYRE. Mr. Smith.

Mr. SMITH. Will there be a judgment on that "coke bottle" rack or stack rack by SAC so that it will meet the SAC requirement for discharging disabled or dangerous weapons within a certain time?

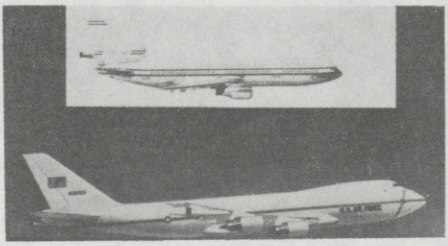
General SLAY. All I can say, Mr. Smith, is that is one of the reasons that we have insisted upon SAC crews and SAC aircraft in the decisionmaking process for evaluating these two concepts. That is the reason for the seven flights per missile, to evaluate the differences in the way one contractor does it and the way the other contractor does it. That certainly will be absolutely central to the decisionmaking process.

Mr. SMITH. That is just one criterion that SAC requires, I understand.

General SLAY. Yes, sir.

CRUISE MISSILE CARRIER AIRCRAFT (CMCA)

(RDT&E)



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 0M
AMENDED REQUEST	$ 90M
DELTA	$+90M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$ 0	$90	TBD	TBD	TBD

Shifting to a different subject, still within the cruise missile area, there is in the amended budget $90 million for a cruise missile carrier aircraft. That $90 million is in fiscal year 1978 and I have shown for fiscal year 1979 and to completion, the total to be determined. We have not gotten that far in our look as to how much this R. & D. program much less the procurement program would be.

I have on the next couple of slides a section of how we would use that $90 million.

CRUISE MISSILE CARRIER AIRCRAFT (CMCA)

(RDT & E)

FY 78 PROGRAM

CURRENT EFFORT — NONE

PROPOSED ADDITION — + $ 90 M

SYSTEMS DEFINITION STUDY

DEMONSTRATE AGM-86B AND AGM-109 MISSILE LAUNCHES

- BUY OR LEASE WIDE BODY AIRCRAFT

PROVIDE BASIS FOR FUTURE CMCA DEVELOPMENT

We would, of course, do a systems definition study. We would buy or lease a wide body aircraft and demonstrate both the AGM–86 and AGM–109 launches from that, or alternatively, the winner of the competition, depending upon when this was done. That would provide the basis for a future cruise missile aircraft development.

CRUISE MISSILE CARRIER

DEMONSTRATION

PHASE I

DEFINITION/SOURCE SELECTION - $5M

5 MONTH EFFORT

PHASE II

SINGLE CONTRACTOR FLIGHT DEMONSTRATION - $50M

LEASED AIRCRAFT ($10M)

20 HOUR AIRCRAFT FLIGHT TEST TIME ($20M)

CONTRACTOR SUPPORT ($5M)

BUILD LAUNCHER EQUIPMENT ($10M)

LIMITED AVIONICS ($5M)

FULL SCALE DEVELOPMENT

START-UP COST - $35M

TOTAL FY 78 COST $90M

A further breakdown is in two phases. This is an Air Force Systems Command chart. They propose a definition and source selection, for about $5 million and a 5-month effort, to evaluate the proposals from the various contractors. Almost all wide body aircraft manufacturers have indicated an interest in this. Phase 2 would be to zero in on the single contractor for a flight demonstration. The $50 million would include leasing an aircraft, providing enough money for modifications to the aircraft that were necessary, and demodifying the aircraft subsequently. Twenty hours of aircraft flight test time, contractor support, building launcher equipment, and limited avionics in the wide body aircraft would also be included. All of that would be done with this $50 million.

That doesn't say that, if we extend this test program on that that is a sufficient amount. That is for 20 aircraft flight test hours.

Full scale development, subsequent to this demonstration, includes startup costs for an additional $35 million in the latter phases of fiscal year 1978.

Mr. SMITH. Do you have an IOC that that money will protect?

General SLAY. I do not. We haven't got that far in looking at this. Perhaps Dr. Perry could add something to that.

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Mr. SMITH. As the chairman discussed, there will be some questions that will be submitted to the Department later, and perhaps you could provide that and other information later.

General SLAY. I apologize for not being able to answer it, but we are behind the power curve. We haven't got that far in our planning.

Senator MCINTYRE. We understand.

DMA/TERCOM

(O&M)

FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	0
AMENDED REQUEST	$ 3.4M
DELTA	$ 3.4M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
0	3.4	5.3	CONTINUING	CONTINUING

General SLAY. Also, as part of the cruise missile package, there is a Defense Mapping Agency operations and maintenance request for an additional $3.4 million.

DMA/TERCOM

(O&M)

FY 78 PROGRAM

CURRENT EFFORT - NONE

PLANNED FY 79 START

PROPOSED EFFORT $+3.4M

ACCELERATE PRODUCTION OF TERCOM DATA BY ONE YEAR ($3.4M)

AREA ANALYSIS

DIGITAL PRODUCTION AND PROCESSING

MATRIX VALIDATION

MATRIX / TARGET POSITIONING

This is, of course, for speeding up DMA effort in support of the TERCOM system. They would do a faster area analysis. Dr. Perry showed you the day before yesterday how they were going about that and some of the results to date. They would also speed up the additional production and processing. This includes a manufacturing technique to [deleted]. In other words, the validation provides an [deleted]. That is what is being done with that $3.4 million.

Mr. SMITH. The last item is not in the authorization bill. It is O. & M., and would therefore be in the companion appropriation bill. It is not part of the subcommittee's consideration.

General SLAY. That finishes the cruise missile portion with the exception of Dr. Perry's discussions of the DARPA program for $15 million.

If you would like, I could continue on with the aircraft modification portion. What I have just shown you has finished the cruise missile related portions of this amendment with the exception of Dr. Perry's short discussion.

Dr. PERRY. Perhaps this would be an appropriate time to finish the cruise missile discussion?

Senator MCINTYRE. What is that?

Dr. PERRY. I am prepared to finish the cruise missile discussion by discussing the DARPA initiatives. At this stage, alternatively, you might want to take a recess or we could proceed with General Slay's discussion.

Mr. SMITH. Mr. Chairman, if I may, may I suggest that the subcommittee proceed the following way. Dr. Perry could go ahead, since this topic is logically related to the discussion General Slay just finished about second generation cruise missile proposals. Then there is one element of the strategic bomber penetration, the ASALM, which seems to be also logically related to Dr. Perry's discussion of the second generation missile programs. General Slay could break that out and discuss it.

General SLAY. I will put it behind Dr. Perry's presentation.

Senator MCINTYRE. Go ahead.

Dr. PERRY. I won't use the chart. As a matter of fact, I will simply point out that the DARPA program falls in three categories, studies related to improved penetrators—I will discuss those items in some detail; a very small study on the analysis of innovative air carrier concepts as a way of carrying the cruise missiles; and two studies in subsystems technology, one which has to do with an advanced small engine, and another which has to do with an advanced guidance system.

This chart will be available for the record and be available to look at. It not only gives the fiscal year 1978 funding which we are proposing but gives you some indication of how these programs would extend to the outyears.

With that brief introduction of the chart, I think you can ignore it and we can proceed with the discussion without the chart.

Mr. SMITH. May we leave it up?

Dr. PERRY. Yes, sir. [Deleted.]

[Deleted.] We believe, we expect that the Soviets will continue to improve their air defense and, therefore, we will have to continue to improve our cruise missiles.

The specific investigations that will be conducted here have to do, first of all, with further research [deleted]. And as I indicated on Wednesday, we can expect improvements of a [deleted].

This program conducts further R. & D. in that area and is done by the same team that did the original research, original R. & D. [Deleted.]

[Deleted] is adapting a technique known as radar absorption material. The use of radar absorbant material is a standard technique for reducing cross sections of objects. In our case our problem is to find a radar absorbant material which can be used in high temperature bodies, which can be used in the outlet in the exhaust of an engine.

Our concepts here involve using composite materials in order to [deleted].

A further point on reducing observables is to observe that the figures which I have shown you to date have had mostly to do with [deleted].

Senator SCHMITT. That would reduce range?

Dr. PERRY. [Deleted.]

Senator SCHMITT. [Deleted.]

Dr. PERRY. [Deleted.]

The plan of this program to have the feasibility demonstration in fiscal year 1978 and then proceed with a vehicle demonstration in fiscal year 1979 and beyond. That is what is indicated by these charts.

It is also planned when we get into building full-scale vehicles and conducting flight demonstrations with them, that the program will be transferred over to the appropriate service.

Now, going down to the [deleted].

The solution to that problem—at least a proposed solution to that problem—is to develop a [deleted]. It is an important program, as suggested by the earlier question, because it will help compensate for some [deleted].

Finally, there is a section of study that has to do with [deleted].

However, with the techniques that are being investigated here, where we can get down to [deleted] which we have been describing to you.

So that represents the body of R. & D. initiatives in DARPA. These would be directed toward improvements in the cruise missile, for future generations, and would be intended to [deleted].

That is all I had to present on this, Mr. Chairman. I am certainly open to questions.

Senator MCINTYRE. Mr. Smith.

Mr. SMITH. Dr. Perry, you are aware I assume, that this year's conference committee directed the Department of Defense to intensify its investigations of nonnuclear arming of the theater land attack versions, the GLCM and SLCM versions of the Tomahawk. It was their intent, as I understand it, to have that effort subsumed within the funding that had been authorized for those programs. In particular they had in mind advanced terminal homing which would be necessary to accommodate HE arming.

Is this request in any way related to that direction and if so, why is it necessary now to come in for additional money? It seems that you are requesting a third of the $15 million, in order to comply with a direction which the committee had assumed you could accommodate within the authorized funding levels.

Dr. PERRY. Mr. Smith, that is a very good point. I did want to point out to you when I presented this that the application really was more responsive to the initiative you are suggesting rather than to the SIOP issue.

The direct answer to your question, though, is while this initiative was conceived 6 or 7 months ago, when we actually put the budget together in early January and February, it did not make the cut. When we asked DARPA to reconsider what programs might be proposed to advance cruise missile technology, this is one that they put in. My agreement to this program being in here was not because, as I pointed out, it was crucial to the SIOP, but because I thought it was

responsive to the original request. So this could very well have been put in the original program and probably should have been.

Mr. SMITH. To take the matter a step further. The fundamental rationale for the supplemental is that the President decided not to procure the B–1, so the supplemental, then, is an effort to try to fill that vacuum.

This particular part of the DARPA request is, I assume, self-evident from what you say, not related to the B–1 decision.

Dr. PERRY. I would say marginally related to the B–1 decision. It is also related to some other guidance work going on. Maybe Captain Locke would describe that.

Captain LOCKE. In response to the conference committee direction, we planned to work on an [deleted]. We showed the committee, in the spring, the work we have already done in the advanced development of the SMAC. We have had two successful Tomahawk missile flights with it.

Another effort related to the [deleted] is to digitize it. SMAC is currently an analog system in which is more difficult to input the initial target information in that it would be if it was digitized.

We are now captive flying what we might call [deleted]. We think we can get down to accuracies of [deleted]. Another investigation is the adaptation of the global positioning satellite. That work obviously goes on without anything from the cruise missile program, but we need to adapt the receivers that would be developed under the GPS program to cruise missiles and perhaps try them in calendar year 1979.

JTIDS is the other one we are looking at. You are familiar with that?

Mr. SMITH. Yes.

Captain LOCKE. Again, it is a question of adapting a system that is under development already, getting a receiver into a missile, and showing that we can use the JTIDS system. We should be able to fly that in fiscal year 1979, or fiscal year 1980.

Mr. SMITH. One other question about the [deleted] part of the request: Is that chart available so that Senator Goldwater might see it? This is the $15 million DARPA request?

Dr. PERRY. The chart is available.

Mr. SMITH. On the [deleted].

Dr. PERRY. I put it differently than that.

[Deleted.] We would have that option.

Senator SCHMITT. Dr. Perry, is that a ceramic engine that you are working on now, or is ceramic technology being applied to the cruise missile engine?

Dr. PERRY. There is some technology being pursued for ceramic turbine blades; however, cruise missile engine is not ceramic.

Senator SCHMITT. Do you have intention of moving in that direction for higher efficiency?

Dr. PERRY. Yes, sir, [deleted].

Senator SCHMITT. Are you working with NASA in this area? They have had quite an extensive ceramic program going for a number of years.

Dr. PERRY. DARPA people are working with NASA; yes.

Senator MCINTYRE. Mr. Old?

TECHNOLOGY BASE

Mr. OLD. Dr. Perry, I notice that the Department of Defense and its defense agencies currently has $428 million against the technology base, and this is a request to increase that amount by $15 million. The technology base for all defense agencies, as I understand it, for R. & D. would be $443 million. The question is, isn't there room for reprograming for that rather small amount to pursue this particular program.

Dr. PERRY. Mr. Old, I don't want to appear to be preaching on this point, but I am personally very concerned about what happened to our technology base, about where our technology base in the fiscal year 1978 program stands.

I think it is already lower than it should be. I think it is crucial in our maintaining our technical lead over the Soviet Union to maintain that technology base and to keep it growing. So I guess my answer to your question is, I feel we are starting off from a position where that base is already too low and, therefore, I would argue against absorbing these admittedly small increments into the base which is already low.

Mr. OLD. I believe it is correct to say that this committee probably more than all others in the Congress has supported the technology base. I suggest that this committee has probably never made any significant cuts out of that area. I would also suggest that had the administration requested an increase in the technology base, we would have approved it almost as to the extent requested.

Dr. PERRY. Mr. Old, I think your points are well taken. The erosion of the technology base, as you know, took place in the late 1960's and early 1970's. The turnaround that took place, and this committee was instrumental in starting to make the turn, has just been in the last 2 years, but we have a very considerable deficit to overcome to get it back to a reasonable rate.

Mr. OLD. A $15 million request against $428 million is hardly going to get you well, and you have $788 million in all of the defense agencies in all categories for research and development. So it is just a question of whether or not you couldn't squeeze that amount.

Thank you, Mr. Chairman.

Senator MCINTYRE. We have a pretty good record in the subcommittee of protecting 6.1 and 6.2, because we do realize therein lies the heart of our technology. We want to keep that lead we have, and we are very aware of its importance.

We also are out to protect the dollars.

Dr. PERRY. Thank you.

Senator MCINTYRE. Do you have any more?

Dr. PERRY. I would make one quick observation. A major factor in our ability to confidently predict we are going to be able to keep ahead of the Soviet air defense during the 1980's is the work we did on the technology base: very specific, very appointed work which gives us the technological edge we have today.

Senator MCINTYRE. This seems to me a quite familiar point during the time I've been observing research and development as a layman. You would consider that a pretty rich field?

Dr. PERRY. Yes, sir.

Senator McIntyre. I have seen new technology bypass an existing technology that is in production; I think we have a dangerous situation from that standpoint. So we may try to go too fast in our cruise missile development, only to have new technology come along and make a lot of the work we have done wasteful.

Dr. Perry. I think we should be mindful of that when we make the consideration when to apply this technology to a production missile, to replace the production missiles which we are proposing today. That will be a very crucial issue whether this decision should be made in 1982 or 1984 or 1985.

From an R. & D. point of view, we want to be in a position that our technology is not a limiting factor. Rather, we simply want the most efficient way to transit from the first generation to the second.

Senator McIntyre. Well, I think it is something you have to bear in mind.

Senator Schmitt. I would comment very briefly and remark and say that whether it is in space or defense or anywhere else, I think the greatest danger to a democracy in the technological area is that we keep waiting for tomorrow's technology and you have to live with today's technology; but I do feel that we have a great deal to learn in how to design general systems so they can adapt to tomorrow's technology, as tomorrow's technology appears, and I think we have run into that problem primarily in our design of aircraft.

I think we have a whole new effort in front of us, to try to learn how to design aircraft that the basic design, not in the production, but in the basic design, there is a very adaptable matrix for new technology.

So I think we have to do this in the cruise missile effort.

I am impressed by the last chart, that you are thinking that way, taking some basic designs, whatever the competition produce, that are adaptable to some broad range, and broad as possible range of new technology that you can develop through other efforts.

It is tough to have built a weapon system and know that today you can build a better one for the next year or two. You do leapfrog that way, and I think we have to recognize that, but I think we also may have been remiss in the past in that we did not build into our basic, fundamental specifications that kind of design flexibility for the future. I hope you are doing it now. You haven't said that, but I get the impression that is at least part of the effort in a DARPA program.

Dr. Perry. That is correct.

Senator Schmitt. Also, if I may ask one question, do you communicate very closely with our air defense people as you work the problem of developing cruise missile or some other weapon system, to penetrate an adversary's defenses? Do your ideas on that feed back into our own ADC effort?

Mr. Walsh. In fact, as a matter of national policy, we have decided to reduce our air defense system to essentially maintaining peacetime sovereignty rather than to mount a serious, comprehensive air defense. This is because we believe that, given the vulnerability of our Nation to ballistic missiles, it would be a wasteful expenditure of resources to try and just protect against bombers.

The Soviets have a different view, for reasons that are somewhat difficult to understand, because they, too, are quite vulnerable to ballistic missiles, yet they persist in mounting a serious defense.

Nonetheless, there is a coupling at the technological level between our bomber penetration efforts and the air defense efforts, limited although they be.

As a matter of fact, I think that the understanding now of the interaction between bomber penetration and defense against bombers is much better than it's ever been in the past. It does have considerable applicability to our tactical forces and we try and apply the lessons there.

Senator SCHMITT. Well, I submit anybody who has studied Soviet history knows why they concentrate on defense. It may not seem rational to us but it is something their history shows they have been extremely worried about. I think there is even within that you can see why they have had to be defense minded and you may, in your judgment, assume that they go overboard in this. I frankly have a feeling that they are not so dumb.

Mr. WALSH. I think from their history one can certainly see why they are interested in defense; however, the defense they have is equivalent to locking and double barring the front door while the back door stands open; and one wonders about the internal logic of it.

Senator SCHMITT. Well, I agree with that, but I certainly hope that we begin to be a little bit concerned about the Soviet cruise missile program and at least analyze the effect of that program on our own ability to respond. Thank you.

Senator MCINTYRE. I want to try to get the direct testimony in.

Let's go ahead, General Slay, to the strategic bomber upgrade.

General SLAY. Yes. In accordance with the request, I will talk first about strategic bomber enhancement.

STRATEGIC BOMBER UPGRADE

RDT&E	ORIGINAL REQUEST	AMENDED REQUEST	DELTA
STRATEGIC BOMBER ENHANCEMENT	$ 26.5	60.4	+33.9
PROTECTIVE SYSTEMS	33.4	35.9	+2.5
B-52 SQUADRONS	10.8	43.0	+32.2
E-O WARFARE	6.7	8.7	+2.0
PROCUREMENT			
A/C MODS	$ 662.0	695.0	+33.0

These are the strategic bomber upgrade programs that we have in work in the budget amendment. The first one I would like to talk about is strategic bomber enhancements, which include the ASALM, or advanced strategic air launched missile.

STRATEGIC BOMBER ENHANCEMENTS

(RDT&E)

FY 78 BUDGET REQUEST			
	TOTAL	ASALM	OTHER ENHANCE
ORIGINAL REQUEST	26.5	24.1	2.4
AMENDED REQUEST	60.4	38.1	22.3
DELTA	+ 33.9 M	+ 14.0 M	+ 19.9 M

FUNDING					
	FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
ASALM	31.52	38.1	67.0	CONTINUING	TBD
STUDIES & ANALYSIS	1.885	6.8	6.5	CONTINUING	TBD
BOMBER LETHAL DEFENSE	2.189	11.0	35.6	CONTINUING	TBD
ADVANCED CONCEPT DEV.	—	4.5	4.9	CONTINUING	TBD
TOTAL	36.394 M	60.4	114.0	CONTINUING	TBD

FY 78 CONGRESSIONAL ACTIONS		
AUTH CONF	HAC	SAC
39.6 M	32.0	39.6

Our original request was for $26.5 million. The $26.5 million was amended to $39.6 million in the Authorization Conference. The Appropriations Committees have still not decided between them whether it is $32 million, $39.6 million, or something in between. That is the status as we understand it.

Senator GOLDWATER. Would that include the ongoing work being done on the B–52 at Tinker?

General SLAY. No, sir, none of this does. On a subsequent chart I will show that. This is strictly for R.D.T. & E. of strategic bomber enhancements, nor for procurement of modifications to the B–52's.

ASALM, which is a new cruise missile, includes studies and analyses related to cruise missile enhancements, bomber lethal defense and advanced concept development. I will talk about these on the next couple of slides.

STRATEGIC BOMBER ENHANCEMENTS

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $26.5 M

ASALM PROPULSION TECHNOLOGY DEMONSTRATION

GUIDANCE & SUBSYSTEM INTEGRATION

[Deleted]

SHORT RANGE BOMBER DEFENSE MISSILE

WIND TUNNEL SCALE TESTING

CRUISE MISSILE ENGINEERING IMPROVEMENT STUDIES

MISSILE GUIDANCE COMPONENT MINIATURIZATION

PROPOSED ADDITION + $33.9 M

ACCELERATE ASALM DEVELOPMENT	
[Deleted]	($14.0M)
EXPAND ADVANCED CRUISE MISSILE ENGINEERING STUDIES	($2.0M)
B-52 ECM AND LETHAL DEFENSE STUDIES	($11.9M)
B-52 D UTILIZATION AND IMPROVEMENT STUDY	($0.7M)
ADVANCED CRUISE MISSILE CARRIER STUDIES	($2.5M)
ACCELERATE MINIATURIZED SUBSYSTEM COMPONENT DEVELOPMENT AND TESTING	($2.8M)

Currently, we have a propulsion technology demonstration in ASALM. This program has been structured as what we call a 6.3 or advanced development project. The goal of that advanced development project is to integrate the guidance and all subsystems into a body, not necessarily a cruise missile body, but something that resembles it. We would have a propulsion demonstration of the possibility of a rocket ramjet to perform as we say it will. The earliest IOC or initial operational capability under the current program would have been, in my opinion, about [deleted].

Also in this program is a short-range bomber defense missile which may or may not be "short range." It might turn out to be a version of ASALM.

Senator GOLDWATER. You said, or you inferred, that the IOC in [deleted] was a former judgment?

General SLAY. Yes, sir. We are now saying that with this additional money and program acceleration, we could get as early an IOC as late [deleted]. That is with the budget amendment.

Senator GOLDWATER. Do you believe that?

General SLAY. I believe we can, sir, if we restructure the program and understand the risk that is involved.

The $33.9 million addition would do several things: $14 million of that money would accelerate ASALM development. I have a chart

to show how we might propose to restructure this program for an IOC a couple of years earlier than we had originally talked about. We would expand advanced cruise missile engineering studies to be in synch with some of the things that Dr. Perry just talked about, for $2 million; B–52 electronic countermeasure work but more specifically lethal defense studies, would cost $11.9 million. As you know, we have very little in the way of lethal defense on the B–52 today. We would do studies to determine if ASALM is the right way to go for bomber defense, or if there should be a smaller, shorter range missile, for $11 million.

A B–52D utilization and improvement study would cost $700 thousand. Advanced cruise missile carrier studies, to go along with the point that I briefed a moment ago, and miniaturized subsystem component development and testing, specifically as related to cruise missiles, are the rest of what is in the $33.9 million.

[Chart deleted.]

I spoke about bomber defense for the B–52. It is within the state of the art [deleted]. That is a projection not yet proved, but that is the capability that we suspect we have.

So there are [deleted] is what we are shooting for at mach [deleted] which is something around [deleted] time of flight.

Mr. SMITH. Would you repeat that?

General SLAY. About [deleted].

Senator MCINTYRE. What was the last thing you said?

General SLAY. [Deleted.] It is just a matter of physics.

Senator MCINTYRE. What is mach four?

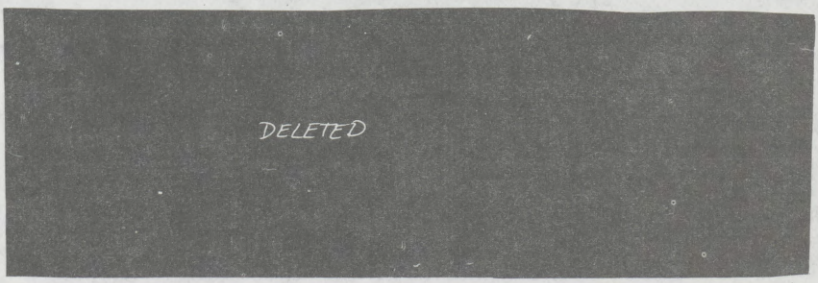
General SLAY. [Deleted.]

Mr. SMITH. [Deleted.]

General SLAY. [Deleted.]

Defense suppression, as Dr. Perry showed the day before yesterday is a second ASALM goal [deleted].

ASALM



RDT&E COST*		RDT&E COST	
CURRENT ON-GOING PROGRAM - COMPLETE FY 80		ACCELERATE CURRENT	$661.0M
PROPULSION TECHNOLOGY VERIFICATION (PTV)		PROGRAM INCLUDING PTV	
TECHNOLOGY INTEGRATION STUDY (TIS)	$86.9M	CANCEL PTV AS OF	$634.0M
CURRENT PROPOSED FOLLOW-ON	588.5M	SEP 1977 AND BEGIN	
2 CONTRACTOR ADV DEV		COMPETITIVE DEV	
1 CONTRACTOR FULL SCALE DEV			
	$675.4M		

*ALL FIGURES IN FY 77 DOLLARS

This is the current program that I talked about at [deleted]. We feel we can get a Crep, with the inertial system only, of about [deleted]. At [deleted].

We could incorporate TERCOM or some of the advanced systems R.D.T. & E. costs of the total program to bring us into an initial operational capability: $675 million is our current estimate. This is an early estimate subject to change.

If we want to do an accelerated program, to get this into the [deleted] time-frame, performance, of course, would be the same as I have shown. We would accelerate the current program or, alternatively, we would restructure it, as I will talk about in just a moment. That would reduce total cost somewhat by increasing the earlier program. We could cancel the propulsion technology verification program we currently have going on ASALM and go directly into some sort of competitive development this fall.

If we wanted to do it that way, it would reduce, if you will, the cost of the R. & D. program from about $675 million to $634 million.

If we did this, that would mean that we would start now to restructure from a pure technology program into a program that would have as its principal goal bringing a missile into the inventory.

Those are the things that we could do.

We have taken a very preliminary look at ASALM as a [deleted] but it would be a very large missile compared to the missiles that we have talked about here.

Mr. SMITH. Excuse me, General. Three items on the ASALM. To begin with, the $14 million you are requesting would not be additive to the $13.1 million authorized by the——

General SLAY. It would not.

Mr. SMITH [continuing]. Conference?

No. 2, for whatever it is worth, there is a statement on the record to this committee that this roughly $14 million authorized over and above the President's request would protect a [deleted]. We know that that is a soft estimate, but still for whatever it is worth, that should be noted.

General SLAY. You are probably looking at the man that made that statement, and I am waffling a bit.

Mr. SMITH. I understand.

General SLAY. Based on later information. I still feel we can make [deleted]. However, to be on the safe side, I said late [deleted].

Mr. SMITH. Third, is it not possible for one of the witnesses to recognize to some degree the plain fact that this subcommittee led the Department to this acceleration even before the B–1 decision?

General SLAY. Should I say kicking and screaming, Mr. Smith?

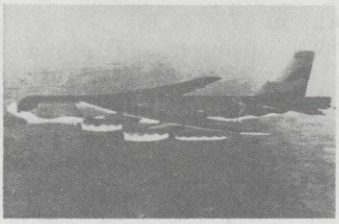
Mr. SMITH. There was perhaps one witness at the table who was to some degree doing that.

Dr. PERRY. Mr. Smith, we acknowledge your statement.

Mr. SMITH. Thank you.

PROTECTIVE SYSTEMS

(RDT&E)



FY 78 BUDGET REQUEST		
	TOTAL	B-52 EFFORTS
ORIGINAL REQUEST	33.4 M	9.4 M
AMENDED REQUEST	35.9 M	11.9 M
DELTA	+2.5 M	+2.5M

FUNDING					
	FY 77	FY 78	FY 79	TO COMPLETION	TOTAL
PROJ 5615	10.9	11.7	9.9	CONTINUING	N/A
PROJ 3829	3.4	4.7	6.1	CONTINUING	N/A
TOTAL	26.5	35.9	36.1	CONTINUING	N/A

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
28.4 M	28.4 M	28.4 M

General SLAY. Getting into protective systems for the B–52, our original request was for $33.4 million total. The amended request added $2.5 million to that, for a couple of projects related principally to the [deleted].

PROTECTIVE SYSTEMS

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $9.4 M

- TAIL WARNING SYSTEM
- ELECTRONICALLY STEERABLE ANTENNA
- POWER MANAGEMENT SYSTEM
- ALQ-117 UPDATE STUDY
- IMPROVED INFRARED FLARE

PROPOSED ADDITION +$2.5 M

- ACCELERATE ALQ-117 STUDY ($1.0M)
- START NEW DOWNLINK JAMMING SYSTEM AND NEW FLARE EFFORTS ($1.1M)
- CONDUCT IFF/COMMUNICATIONS JAMMING STUDY ($0.4M)

This chart shows our current $9.4 million program for protective systems for the B–52. We are working on a tail warning system, an electronically steerable antenna, and a power management system that was discussed a little bit the other day. [Deleted.]

Senator GOLDWATER. Could you explain the electronically steerable antenna? For what do you use it?

General SLAY. You use it [deleted].

Senator GOLDWATER. Is that a parabolic antenna?

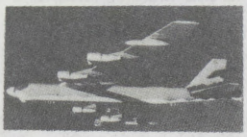
General SLAY. No; it is a phrased-array type of antenna. It is not steerable very much, but it is steerable.

Under the new program, the addition of $2.5 million would accelerate ALQ–117 the evaluation of improvements to the system. This ALQ–117 is [deleted]. We will also start a new downlink jamming system and new flare efforts to improve our infrared and countermeasures capacity for $1.1 million of the $2.5 million. We would also conduct an IFF and communications jamming study, for about $400,000, in the area of protective systems.

We do have additional ECM work going on in a line item we call B–52 Squadrons that I will talk about a little bit.

B-52 SQUADRONS

(RDT&E)



FY 78 BUDGET REQUEST	
	TOTAL
ORIGINAL REQUEST	$10.8M
AMENDED REQUEST	$43.0M
DELTA	$+32.2M

FUNDING					
	FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
AVIONICS UPDATE	2.6	40.7	49.6	CONT.	CONT.
DOPPLER	1.5	.3	.3	0	2.1
SACDEF	.3	.3	.5	CONT.	CONT.
NUCLEAR HARDNESS	0	1.7	1.5	0	3.2
TOTAL	6.1M	43.0M	51.9M	N/A	CONT.

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
8.8	5.4	8.8

This is B–52 Squadrons. We have added $32.2 million for avionics update. Doppler, and I couldn't let the Navy get away with their acronym; we have one, too; SACDEF.

Senator MCINTYRE. What is that?

General SLAY. SACDEF, that is strategic avionics crew station design evaluation facility.

Senator MCINTYRE. No wonder we can't understand you.

Senator GOLDWATER. The Navy started all of that.

General SLAY. Yes, sir, they did. We have to keep up. It is a human factors simulator to see you get the most out of the design of a cockpit and avionics system from a man. That is all that it does.

The $32.2 million includes some additional work in nuclear hardness. We still have divergence between the House Appropriations Committee and the Senate Appropriations Committee to the tune of $8.8 million for the conference and $5.4 million for the House.

B-52 SQUADRONS

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $10.8 M

B-52 AVIONICS UPDATE

UPDATE BNS TO INCREASE EFFECTIVENESS AND REDUCE SUPPORT COST

COMMON STRATEGIC DOPPLER

DEVELOP NUCLEAR HARDENED DOPPLER

SACDEF

GROUND TESTS NEW SYSTEMS AND DOES HUMAN ENGINEERING BEFORE FLIGHT TESTING

PROPOSED ADDITION +$32.2 M

B-52 AVIONICS UPDATE	($30.5M)
ACCELERATES PRODUCTION ONE YEAR - FIRST AIRCRAFT JUNE 81	($20.5M)
ADDS MISSILE LAUNCH INTERFACE DEVELOPMENT	($8.0M)
INITIATES STUDIES FOR LIFE EXTENSION (EG: ELECTRICAL, POWER, AND CONTROL)	($2.0M)
B-52 NUCLEAR HARDNESS STUDY	($1.7M)
CONTINUES WEAPON LAB EVALUATIONS OF VULNERABILITIES TO BLAST, THERMAL, AND EMP EFFECTS	

These are the kinds of things we are doing today. This is a B–52 avionics update where we are updating the bomb nav system to increase its effectiveness and reduce support costs. We have a common strategic Doppler that we have developed for all strategic systems. We are doing nuclear hardness work on this common strategic Doppler. This SACDEF, or the human factor simulator, ground tests new systems and human engineering before flight testing.

The additional $32 million would do the kinds of things necessary to accelerate production 1 year. The first aircraft would be out in June of 1981, instead of June 1982. It would add the missile launcher interface development for $8 million and initiate studies for life extension for $2 million.

I told you a moment ago that we are trying to determine how you extend the life of the B–52. We are not yet too far into that, but we are doing some of the points, Senator Goldwater, and Senator Schmitt made, to do something with the electrical power and control systems in order to be sure that we can get the life out of the B–52 that the airframe will allow.

The $32 million includes a nuclear hardness study. We want to continue work that the Weapons Lab currently is doing on vulnerability, blast, thermal and EMP effects, as well as transient radiation effects on avionics within the system.

ELECTRO-OPTICAL WARFARE

(RDT&E)

FY 78 BUDGET REQUEST		
	TOTAL	E-O
ORIGINAL REQUEST	$6.7M	$3.8M
AMENDED REQUEST	$8.7M	$5.8M
DELTA	$2.0M	+2.0M

FUNDING					
	FY 77 & PRIOR	FY 78	FY 79	TO COMPLETE	TOTAL
E-O WARFARE	—	$5.8	$11.0	CONTINUING	TBD
ADV EO CM POD	—	$2.9	$ 1.1	CONTINUING	TBD
TOTAL	—	$8.7	$12.1	CONTINUING	TBD

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
6.7	6.7	6.7

We are doing some work on electro-optical warfare as related to strategic systems. We have asked in this new budget amendment for an additional $2 million, as I will describe in a moment. All the committees have agreed on the $6.7 million original request that was in the fiscal year 1978 budget.

ELECTRO-OPTICAL WARFARE

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $6.7M

TECHNOLOGY BASE PROGRAM / RISK REDUCTION, FEASIBILITY, MILITARY VALUE OF ELECTRO OPTICAL TECHNIQUES, COMPONENTS AND SYSTEMS

STRATEGIC BOMBER TASKS

IRCM / EOCM FOLLOW-ON SYSTEM

IRCM / EOCM / RFCM INTEGRATION

HIGH ENERGY LASER CM

PROPOSED ADDITION $2.0M

ACCELERATES EOCM, IRCM, AND HIGH ENERGY LASER CM TECHNOLOGY ($2.0M) AND IRCM / EOCM / RFCM INTEGRATION FOR THE B-52 BY ONE YEAR

This is a technology program for risk reduction, studying feasibility and military value of electro-optical techniques and component and systems related thereto.

In the strategic bomber tasks, we are looking principally at infrared countermeasures and electro-optical countermeasures, various types of shielding, various types of flares, various types of laser devices and other electro-optical countermeasures.

Finally, we are looking at high-energy lasers. Of course, we have some sort of indication [deleted] that the Soviets are looking at this. We are just trying to keep ahead of the ball game and [deleted].

The proposed addition of $2 million would do principally the same kind of thing but it would accelerate the effort.

HIGH ENERGY LASERS

Senator GOLDWATER. Dr. Perry, how much faith do you put in the reports that the Soviets have made breakthroughs in high-energy lasers?

Dr. PERRY. The reports that I read deal both with high-energy laser and with charged-particle beam weapons. Are you referring to both of those, or just the high-energy laser?

Senator GOLDWATER. I thought they had made a breakthrough with [deleted].

Dr. PERRY. Senator Goldwater, I am not aware of any breakthrough that they have made. I do know they have a vigorous R. & D. program in this field.

[Deleted.]

Mr. Walsh, would you like to comment on that further?

Mr. WALSH. Well, we are aware of a fair amount of effort in the laser business, as well as apparently a strong interest in charged-particle beams as suggested by some inferences from the open literature. They also have fairly extensive facilities that seem to be associated [deleted] but as far as we ascertain, they have made no breakthroughs; and, moreover, there are some fairly fundamental physical phenomena they are up against which don't really appear to permit massive breakthroughs.

Laser weapons, beam weapons, are things that are conceptually possible, but when we examine them as for their practical utility, it seems as though they are very far, as are we, from practical application.

Senator GOLDWATER. As scientists, do you see the possibility of breakthroughs in this field?

Mr. WALSH. I don't really see the possibility of breakthroughs, as such. I do see the possibility of specialized applications [deleted] things that the average person seems to think. They would have application in [deleted].

Senator GOLDWATER. We are about in the same shape they are in, and they are about in the same shape we are in?

Mr. WALSH. By and large, yes.

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AIRCRAFT PROCUREMENT, AIR FORCE

(MODIFICATION OF IN SERVICE AIRCRAFT)

FY 78 BUDGET REQUEST		
	TOTAL	B-52
ORIGINAL REQUEST	662.0	51.8
AMENDED REQUEST	695.0	84.8
DELTA	+33.0	+33.0

FUNDING					
	FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
B-52 / ALR 20 A	-	10.0	-	-	10.0
B-52 / ALT 28	-	11.5	6.5	-	18.0
B-52D BOMB / NAV	-	6.5	49.4	37.4	93.3
B-52 ALCM PYLON TOOLING	-	5.0	-	-	5.0
TOTAL	-	33.0	55.9	37.4	126.3

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
$650.0	$597.8	$650.0

General SLAY. We have an additional item, modification of inservice aircraft for the B–52. We are asking for a total of $33 million extra for these items that I will discuss on the next chart. Right now, the conference authorized $650 million of original $662 million. The House and the Senate are currently working out their differences between the $50 million decrement from the conference and the Senate Appropriations Committee's $650 million.

MODIFICATION OF IN-SERVICE AIRCRAFT

(PROCUREMENT)

FY 78 PROGRAM

CURRENT EFFORT (B-52) $ 51.8 M

ECM EQUIPMENT / ENHANCE DEFENSIVE CAPABILITY

ATTITUDE INDICATOR FAIL WARNING SYSTEM / FLIGHT SAFETY IMPROVEMENT

MISCELLANEOUS MINOR SIMULATOR MODS / TRAINING RELIABILITY IMPROVEMENT

PROPOSED ADDITION + $ 33.0 M

SYSTEMS RELIABILITY / MAINTAINABILITY UPGRADES ($28.0M)

AN / ALR-20A ECM THREAT DISPLAY SYSTEM $10.0M

AN / ALT-28 ECM JAMMER HEAT EXCHANGER $11.5M

AJQ-18 BOMB NAV SYSTEM (B-52D) $ 6.5M

TOOLING FOR PYLON PRODUCTION / ENABLE B-52 CARRIAGE OF CRUISE MISSILES ($5.0M)

Our current ongoing work in this area for that $51.8 million includes ECM equipment to enhance the defensive capability, an attitude indicator fail-warning system, a low-altitude terrain following flight safety improvement, and miscellaneous minor simulator mods.

What this new addition would do is principally in the area of reliability and maintainability. As an example, the Doppler on the B–52D has a mean time between failure of 48 hours. What we are doing to this system in the mod line is to increase it to about 700 mean hours between failures.

Senator GOLDWATER. Forty-eight hours?

General SLAY. Forty-eight hours.

Senator GOLDWATER. What is the major reason for that?

General SLAY. It is old and tired, Senator. It is old and tired. It is old technology, it is hand wired, it generates heat, and it just fails a lot. I can give you better horror stories than that.

Senator MCINTYRE. Don't.

Senator GOLDWATER. I remember the problems you fellows had with the radars in the F–4's over there.

General SLAY. Yes, sir, the F–106 radar also has a problem.

At any rate, that is the type of work that we are doing here, principally enhancing reliability and maintainability. That is all it does, with the exception of $5 million tooling for pylon production to enable the B–52 to carry missiles. That item is included on the previous charts as related to the cruise missiles.

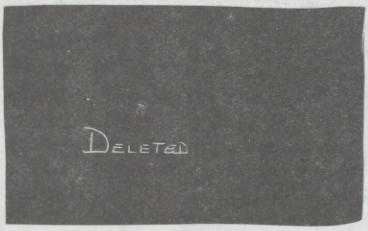
TACTICAL WARNING/ATTACK ASSESSMENT IMPROVEMENTS

	ORIGINAL REQUEST	AMENDED REQUEST	DELTA
RDT&E:			
MISSILE SURVEILLANCE TECHNOLOGY	$ 11.6	19.6	+ 8.0
BMEWS	0	1.0	+ 1.0
PARCS/PAR	0	10.0	+10.0
WARNING INFO CORRELATION	2.1	3.1	+ 1.0

The last category that I will talk about is some improvements in tactical warning and attack assessment in the areas of missile surveillance technology with our [deleted] BMEWS early warning radar, the PAR system that is part of the old Army ballistic missiles defense, and warning information correlation which is trying to correlate the information that is gathered from the various warning systems. [Deleted.]

MISSILE SURVEILLANCE TECHNOLOGY

(RDT&E)



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$11.6M
AMENDED REQUEST	$19.6M
DELTA	+ 8.0M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$ 25.1	$19.6	$35.9	CONTINUING	TBD

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
9.13	9.13	9.13

Our original request was for $11.6 million. We are asking for $8 million more. Of the $11.6 million, the conference voted for $9.13 million and both the House and the Senate Appropriations Committees have agreed with that amount.

Senator GOLDWATER. [Deleted.]

General SLAY. Yes; we have had [deleted] for a number of years. This effort is to [deleted].

MISSILE SURVEILLANCE TECHNOLOGY

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $11.6 M

ADVANCED SENSORS

DEVELOP MOSAIC SENSOR FOR ORBITAL DEMONSTRATION OF FOLLOW-ON [redacted] TECHNOLOGY - SINGLE CONTRACTOR EFFORT AFTER EARLY 78

MEASUREMENTS

COLLECT DATA ON TARGETS AND BACKGROUNDS REQUISITE TO ADVANCED MISSILE SURVEILLANCE

PROPOSED ADDITION + $ 8.0 M

ADVANCED SENSORS

CONTINUE PARALLEL DEVELOPMENT OF TWO CANDIDATE MOSAIC SENSORS ($8.0M) INTO FY 80.

BOTH APPROACHES UNIQUE AND WARRANT INVESTIGATION

ORBITAL DEMONSTRATION SCHEDULED FY 82

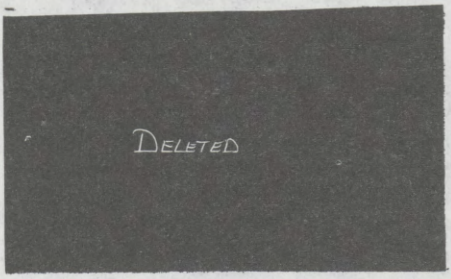
Senator GOLDWATER. [Deleted.]

General SLAY. Yes. The work is for what we call a [deleted]. We want to demonstrate in our current program an orbital test or verification in the early 1980's. We have two contractors currently, with a single contractor after early 1978.

The addition of $8 million would continue the parallel developments of the two candidate sensors into fiscal year 1980. Both of these approaches, we feel, offer unique aspects and warrant some investigation. We have the orbital demonstration still scheduled under this program for fiscal year 1982.

BMEWS UPGRADE

(RDT&E)



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 0
AMENDED REQUEST	$ 1.0M
DELTA	$ 1.0 M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$ 0	$ 1.0 M	$ 5.0 M	$ 12.3 M	$ 18.3 M

An important one for us is the BMEWS upgrade. This applies to warning of ballistic missile attack on the United States.

Currently, we have resolution cells in our BMEWS, both in the long-range warning radar and in the tracking radar, of about [deleted]. In other words, when an object comes into this cell, we can't tell whether it is five objects or one object. Two ballistic missiles can come through one cell in all three fans of the two radars and a single object report will be sent back to Norad and forwarded to SAC and other users. Since there is no way of determining where the object is in the cell, there is a high probability the trajectory that will be sent is wrong. Therefore, you cannot tell where the ballistic missile is headed, except that it is headed toward the continental limits of the United States.

We are adding $1 million in the budget to do a couple of things that I will show you.

[Chart deleted.]

What we want to do under the new system is this—the chart shows on the left the old system and multiple RV's going through the fans. We want to reduce the size of the cell in the large radar from [deleted] in range, and [deleted]. That way, we can forward information back to Norad, SAC headquarters and other users, that will allow better characterization of where the attack is headed.

It is important for several reasons, of course. If the NCA discovers that the attack is on him, he can transfer early to the succession of command. If he determines that it is headed toward the ICBM field, he can make one decision. If he determines it is headed toward New York City or Chicago, he can make another decision. That is what this is all about.

BMEWS UPGRADE

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT - NONE

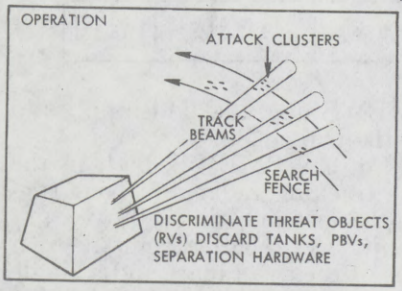
PROPOSED ADDITION + $1.0 M

SYSTEM ENGINEERING FOR IMPROVED RANGE RESOLUTION ($1.0M)
PROVIDES ATTACK CHARACTERIZATION CAPABILITY
IMPROVE DETECTION AND TRACKING COUNT / IMPACT PREDICTION
PERMITS HIGH CONFIDENCE [redacted] ATTACK ASSESSMENT
WITH PAR UPGRADE PROVIDES HIGH CONFIDENCE ATTACK
ASSESSMENT [redacted]

That is all this chart says. I won't spend any more time on it. I have already explained it.

PARCS (PAR)

(RDT&E)



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 0 M
AMENDED REQUEST	$ 10.0 M
DELTA	$ 10.0 M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
US ARMY	$ 10.0	0	0	$ 10. 0

FY 78 CONGRESSIONAL ACTIONS *		
CONF	HAC	SAC
N/A	0	$18.5 M

* ISSUE IS OVER FY 78 O & M FUNDS. IF O & M FUNDS ARE DELETED, PAR IS TERMINATED, AND UPGRADE ISSUE BECOMES IRRELEVANT.

We also have an additional system for attack characterization, a modification to the Army ballistic missile defense system, to help discriminate objects. PAR means perimeter acquisition radar, which is

the Army name. We have added a characterization system on to it: PARCS. We have no money in the current R.D.T. & E. budget. The amended request is for $10 million additional. Today the House and Senate Appropriations Committees are talking about an O. & M. controversy over $18.5 million. This issue is whether or not this program should be continued—not whether it should be upgraded, but whether it should be zeroed out in the O. & M. budget.

If these funds are deleted, then this issue becomes meaningless. If we don't keep O. & M. funds in, then we have no PARCS. The point is that this is very frequently tied to the current discussion in the two appropriations committees.

[Chart deleted.]

What we are saying is that instead of an [deleted] which is very, very important for the reasons that I just discussed.

PARCS (PAR)

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT - NONE

PROPOSED ADDITION $10.0 M

SYSTEMS ENGINEERING	($1.25 M)
HARDWARE	($1.30 M)
SOFTWARE AND DESIGN	($5.40 M)
TEST	($1.05 M)
MITRE SUPPORT	($1.00 M)

OPTIMIZES PAR FOR NCA ATTACK INFORMATION REQUIREMENTS

- INCREASES ICBM / SLBM RV TRAFFIC HANDLING RATE [D]
- INCREASES ICBM COVERAGE TO [D] OF CONUS
- INCREASES ICBM WARNING / ASSESSMENT TIME BY [D]

SUPPORTS CRITICAL PRE/POST IMPACT NCA DECISION TIMING NEEDS

PROVIDES ONLY HIGH ACCURACY IMPACT PREDICTION FOR CRITICAL TARGETS IN MEDIUM AND LARGE RAIDS

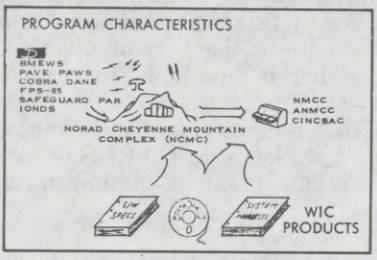
IN CONJUNCTION WITH IMPROVED BMEWS, HANDLES ENOUGH RV TRAFFIC FOR HIGH CONFIDENCE ATTACK ASSESSMENT ON:

CITIES, MINUTEMAN, BOMBER BASES, AND CONVENTIONAL FORCES

We will spend the money basically, in systems engineering, software, design, and tests. That is all that says.

WARNING INFORMATION CORRELATION

(RDT&E)



FY 78 BUDGET REQUEST	
ORIGINAL REQUEST	$ 2.1M
AMENDED REQUEST	$ 3.1M
DELTA	$ +1.0M

FUNDING				
FY 77 & PRIOR	FY 78	FY 79	TO COMPLETION	TOTAL
$7.2	$3.1	$4.1	$ 21.3	$ 35.7

FY 78 CONGRESSIONAL ACTIONS		
CONF	HAC	SAC
2.1	2.1	2.1

The last one is warning information correlation. That is a fancy word for software in computers to funnel all of the data into a central location, to sort it out, to determine precisely what it is that we are seeing, and to help the national command authority make a decision.

WARNING INFORMATION CORRELATION

(RDT&E)

FY 78 PROGRAM

CURRENT EFFORT $ 2.1 M

- APPLY TARGET CLASS ASSESSMENT
  - INDICATE [DELETED] ATTACK
  - ESTIMATE [DELETED] OF NUDETS
- ADAPT SOFTWARE FOR THEATER USE
  - INDICATE EXTENT OF [DELETED] CONFLICT
- SOFTWARE SIMULATORS
- SITUATION DISPLAY SOFTWARE

PROPOSED ADDITION + $ 1.0M

- DATA BASE OPTIONS, MORE COMPLEX ALGORITHMS FOR BETTER ACCURACY, CONFIDENCE ($0.2M)
- UPDATED THREAT SIMULATIONS TO IMPROVE CONFIDENCE ($0.3M)
- WARNING NETWORK SYSTEM INTEGRATION FOR TACTICAL WARNING/ ATTACK ASSESSMENT ($0.5M)

We are asking for $1 million in this program, in order to do the additional work shown.

SUMMARY

	ORIGINAL REQUEST	AMENDED REQUEST	DELTA
AIRCRAFT PROCUREMENT	$7,542.4	6,144.0	-1,398.4
MISSILE PROCUREMENT	$1,874.7	1,903.7	+ 29.0
RDT&E	$4,198.8	4,532.4	+ 333.6
O&M	$2,975.9	2,979.3	+ 3.4
		NET ⟹	-$1,032.4

And that, sir, will conclude my briefing.

Senator McIntyre. Thank you very much.

Has any effort been made to relate the supplemental request for cruise missile funds with the current U.S. position in the SALT talks? For example, under the R. & D. program envisioned for the next 2 years, [deleted].

Dr. Perry. Mr. Chairman, before I answer that question, I would like Captain Locke to give a brief description of the significance of testing cruise missiles at range, the different consideration than ballistic missiles.

Captain Locke, would you respond to that? I will then elaborate on another aspect of the question when the captain has finished.

Captain Locke. Cruise missiles are like airplanes and not like ballistic missiles, so it is generally not necessary to fly them for full range in order to determine their full range characteristics. As you fly them you set up a cruise condition, record the data and then shift to another cruise condition, another altitude or another speed to record the data, and so on. You calculate the range capability related to a particular mission depending upon the mission requirements. The cruise missile can fly high when in a benign environment where no one can intercept it.

From a standoff launch, for example, the missile can get more range by flying higher and sometimes slower. Then it can go down to low altitude to avoid the defense, If the defenses aren't too heavy we can go at a slower speed and increase the range.

Anyway, in the test flight we don't fly at full range capability normally. However, one probably would want to test the full range operational reliability for whatever the requirements are for full range. [Deleted.]

Senator Goldwater. You can do that now?

Captain Locke. We have flown [deleted] nautical miles.

Senator Goldwater. You have?

Captain Locke. Yes, sir; the reason we don't fly farther is that we are taking up fuel space with a parachute. ALCM–B will, of course, have similar characteristics. ALCM–A flew for less range, because it

was smaller, ALCM–B will fly for ranges similar to the Tomahawk in tests. [Deleted.]

Dr. PERRY. Mr. Chairman, I would make a summary answer to the point you raised. If we are not restricted in the range at which we test the missiles, we would plan to test range them to the full capability, which would be on the order of [deleted] at least in the case of the Tomahawk.

If, on the other hand, a restriction on the range at which we can test is imposed, that in itself would not be a serious limitation either to our test program, or for that matter, to the Soviet's test program.

On the other hand, a limitation in range on the operational missiles will impose a problem. Against the current Soviet air defense we would plan to deliver the cruise missiles at what is known as the high GCI line, which is the first point at which the GCI radars could detect a high altitude B–52 coming in.

From the point we can cover [deleted]. That we think would be a satisfactory situation.

On the other hand, if the Soviets developed forward air defense to drive us back farther than the high GCI line, then we are confronted with two alternatives. The first alternative would be to [deleted] such as General Slay described to you. [Deleted.]

The second alternative would be simply to take the cruise missile carries back father and launch the cruise missiles at a greater distance from the Soviet Union. In order to have the flexibility to exercise that latter alternative, we would require [deleted].

So the importance of the range is intimately tied with the [deleted].

Mr. SMITH. Dr. Perry, if you would validate the longer range through the test program that you are proposing, particularly for the TALCM, and then a SALT agreement is defined which has a [deleted] how can it be verified through national independent means that the TALCM that you would deploy on the B–52, if it were the winner, would comply with the SALT agreement?

Dr. PERRY. [Deleted.] That is a very difficult item to determine, as opposed to ballistic missiles, where we have pretty good confidence in being able to do that.

Mr. SMITH. So from what I understand from Captain Locke's technical assessment of how you would validate longer ranges, even if you did nothing further than his current program, if you stopped right now, and then at some later point would deploy what we believed to be a shorter range missile [deleted].

Dr. PERRY. That is correct. Captain Locke.

Captain LOCKE. That is correct.

Mr. SMITH. So in fact the genie is out of the bottle and has been out of the bottle for sometime, on both sides?

Captain LOCKE. Yes, sir, [deleted]. The larger the cruise missile is, the more flexibility you have in fuel tank size engine, and warhead improvements.

Senator MCINTYRE. Let the record show that the Secretary nodded his head in the affirmative in answer to the last question.

Dr. PERRY. I would say yes to that question.

Mr. SMITH. If I may, Mr. Chairman, that analysis coincides with some work the subcommittee has been doing for a couple of years on this verification issue. It is totally consistent with it.

Senator McINTYRE. All right.

This is for the record. Will you please provide, Mr. Secretary, to the subcommittee, by the close of business August 17, all arms control impact statements which are required by law for the new programs you are proposing, and any necessary amendments to arms control impact statements already submitted on existing programs which you propose to modify with this supplemental?

Dr. PERRY. Yes, sir.

Senator McINTYRE. It is important we have that.

With that, we will recess and we will try to get back right away.

[A short recess was taken.]

Senator McINTYRE. The subcommittee will come to order.

At the request of Senator Culver I would like to ask these three questions:

SECOND SOURCE ENGINE

Mr. Secretary, in view of the importance of cruise missiles now, what considerations have you given to the development of a possible second source sustainer engine?

Dr. PERRY. I would like to defer that question to the program manager, Captain Locke.

Captain LOCKE. Yes, sir, we are considering it, I have asked my deputy for engines, who is the system director for the cruise missile engine development, if he would look into it. We considered four options. One is to procure the rights to the data package from the current contractor, Williams Research, and contract a second production source.

Another option would be to develop an engine from another source that would have the same performance characteristics and would fit into the engine space in either of the two cruise missiles.

A third option is to license, that is, to have Williams Research license some other contractor to produce the engine as we often do with foreign engines. Another option would be to direct Williams Research, on a subsystem level, to go out for second sources on critical items. I expect to get the answer to which of those are the most economical approaches, on August 31. We will be able to provide that answer for the record after that time.

Senator McINTYRE. 31st of August?

Captain LOCKE. Yes, sir. The 31st of August this year, as to what our approach will be. We definitely are looking at a second source of engines. It is a question of which way we will be going.

Senator McINTYRE. Can the Williams engine be produced in the quantities required under the new compressed time schedule?

Captain LOCKE. Yes, sir.

Senator McINTYRE. What would be the cost to fit and develop a second source of the engine?

Captain LOCKE. We won't have that answer until the 31st of August and, of course, eventually we have to get a bid. To follow up, we do not intend to reopen the competition with Williams Research. Theirs will be the first engine that will enter into production. The second source will be associated with expanded production to protect the industrial base, and to take the risk out of cruise missile production.

Senator McIntyre. On the ALCM, when would the ALCM long range missile be sufficiently developed, General, to have a basis for making a competitive selection with the TALCM missile for full-scale engineering development?

Captain Locke. Yes, sir; that was shown on the schedule that was up there. We expect to start the first competitive launch by February 1979. It will be a full-sustained flight. Prior to that time shapes will be dropped. That is, shapes that are models of the missile full scale but would not go into sustained flight. The first competitive flight should occur before February 1979.

Senator McIntyre. How much of the $173.9 million in funding requested for this ALCM program is planned to be used for effort such as ground support equipment, technical manuals, and so forth, that may not be required if this missile were not selected for production?

You covered that pretty will in your testimony, you dropped those items.

General Slay. Those are in the testimony.

Senator McIntyre. What are the differences between the launcher planned for the ALCM and TALCM missiles and can a common rack be developed?

General Slay. We covered that also in the testimony.

Senator McIntyre. Would it be advantageous for development and production planning as well as spending of funds to have a firm requirement on the quantity of cruise missiles to be produced including both B–52 requirements as well as any requirements for a cruise missile carrier concept?

General Slay. It would certainly be beneficial, Senator, and we have gone a long way toward defining what that is, but we are not yet prepared to come down hard on precisely how many we need, for the reasons that I have discussed previously. Nor are we ready to come down yet due to the early necessity of our study on the requirement for any particular number of cruise missile carriers or even B–52 modification kits.

Dr. Perry. We can specify [deleted] cruise missiles as an absolute lower limit, with that information alone we can start up the production line initially. The requirement to know how many more than [deleted] are going to be required will probably not affect production efficiency until several years from now. Would you concur with that, General Slay?

General Slay. I would.

Senator McIntyre. The subcommittee staff has been advised that the $103 million was based on funding requirements projected by the contractors to meet a July 1979 IOC with the single-missile program.

Have these funds been reviewed by the TALCM program office in view of the new IOC and competitive development program? If so, what funds can be reduced from the $103 million previously requested?

Dr. Perry. Could I refer that one also to the program manager?

Captain Locke. All that you said is true. The funding that was up there today represents a prudent staff estimate considering that we don't have the proposals in. Those are conservative estimates. We won't really know how much we need until we get proposals from the contractors. I hope that we will be able to lower the overall program through competition. We did in the past. As I previously reported to

this committee, I think for fiscal year 1978 we should proceed with all the funds that are requested. We may be able to show you lower funding when we come back in fiscal year 1979.

Mr. SMITH. Captain Locke, the IOC on which that figure was built was some 9 months earlier than what the Department is now proposing.

Captain LOCKE. The effect of the IOC is related to the fiscal year 1979 dollars rather than the fiscal year 1978 dollars.

Mr. SMITH. Production as well?

Captain LOCKE. I think production as well. There already was $40 million in there for the ALCM–A and ALCM–B. I think that is still necessary to get started. It is reasonable to expect to get the production going with General Dynamics. At least, $40 million would be needed. Also we need to start the engine and the guidance off on a firm production footing.

Mr. SMITH. It seems difficult to understand how a set of figures built on one base, on one set of assumptions, how those figures would still be valid on quite a different set of assumptions which finally are now defined in the last couple of days hearings.

Captain LOCKE. They still have to build the missiles and I think the area that is most soft would be fiscal year 1979. When we get proposals from the contractors and we come back with perhaps a lower number in fiscal year 1979, but it may be higher. Whatever the contractor, General Dynamics in this case, he still is talking about essentially the same work level in fiscal year 1978 with competition or without competition. It involves about the same number of missiles.

Senator MCINTYRE. Captain, has any concentrated study been performed to determine if this acceleration cost is efficient in relation to the requirement and the risk associated with acceleration?

Captain LOCKE. We haven't done a concentrated study, no.

Senator MCINTYRE. No concentrated study?

Captain LOCKE. I can only go back in history that we laid out.

Senator MCINTYRE. I have a bad ear, you have to speak up.

Captain LOCKE. In the programs we laid out before this committee last spring we had a $3.8 million underrun. We also added unfunded imaginary correlator to the program and did the Tomahawk air launch cruise missile study, including wind tunnel tests of a subscale model. So I would say we are going to try to get under the estimates that we have at this time but it wouldn't be prudent to promise you something when we don't have proposals from the contractors. We should make conservative estimates at this time.

Dr. PERRY. Could I make an addition to that comment?

Senator MCINTYRE. Certainly.

Dr. PERRY. The aspect of the budget amendment we are proposing to you today, that I believe will lead to improved efficiency and ultimately lower costs and higher effectiveness in the program, is the introduction of the competitive flyoff between the two contractors. All of our experience in systems procurement indicates that we arrive at a better product and ultimately a lower unit cost when we have a real competition in the design and test phase of the program. So that aspect, at least, of our budget amendment I have high confidence is going to lead ultimately to a more efficient rather than a less efficient program.

Mr. SMITH. Dr. Perry, the question is not really bearing on validity of your assumptions now but whether the numbers in the request relate to those assumptions.

For example, in the ALCM program, the President originally proposed a mid-1980 IOC for the ALCM–B but also supported within that program a development of an ALCM–A.

Now, the supplemental comes in and says we need $50 million more to accelerate that IOC 3 months, but we are also going to drop the A. There ought to be some gain, presumably, by dropping the A. I don't know how large a figure that would be.

General SLAY. $20 million, Mr. Smith. One thing, perhaps, should be said at this juncture; we have been operating on a letter contract with Boeing. The contract is currently being definitized. There is about $31 million delta between Boeing's price that they have seemed to come up on and the program office's original letter contract estimate. So part of that money is absorbed in the $31 million that Captain Locke says is on the conservative side. Until we get a new estimate and finish those negotiations, we won't really know precisely where we stand there.

But, you are right, there is $20 million savings from cancellation of the ALCM–A directly. There is $18 million for new tasks, the pylon and rotary launcher, that were not in the old budget. The remainder of the $31 million is in question on the negotiations.

Captain Locke, have I erred in any fashion?

Captain LOCKE. No, sir.

Senator MCINTYRE. What IOC could be established, General, for the long range cruise missiles program if there were no acceleration directed and a normal program, development program followed?

General SLAY. If we did not accelerate, Senator, and had the money that is currently in the budget, we could not meet a July 1980 IOC. We would meet a December 1980 IOC.

Captain Locke, would you confirm that?

Captain LOCKE. I am not sure we can make the December 1980 IOC. But one of the problems is a misunderstanding of the stress of acceleration. What we want to do is to get into a competition now. We need to start now, to be fair to both contractors. It is not so much the acceleration we are talking about, but to start out a good competition in fiscal year 1978. The $103 million might not be quite justified in detail, but that is not the final dollar estimate anyway. We will not lose the money. If we are committed to competition between the two contractors, if we are committed to cruise missiles, as we seem to be, you won't lose the $103 million and you won't lose the $174 million. It will be efficiently spent.

If you spend the money earlier, you may get there sooner and won't have to spend as much in 1979 and 1980.

Mr. SMITH. You are not suggesting to the subcommittee a figure not directly related to the task you are describing?

Captain LOCKE. You don't have to do that. It will be directly related to the competition but you also should recognize the figure is not going to be that exact at this stage. If we waited several months to get a defined proposal and contract with both contractors, 3 or 4 months will be gone. Then we are in another cycle. We approach

spring, we slip a year, the cost goes up and so on. So they are estimates. We know they are estimates, we know the estimates aren't perfect, but we also know, at least I know, that in the past, we have come in with underruns. I think I can do it again.

Senator McIntyre. Could either of the candidate missiles achieve an earlier IOC than has been established? If so, why was this not directed? Could either of the candidate missiles attain an earlier IOC?

Captain Locke. The answer is yes, sir, they both could, but at increased risk. Obviously Tomahawk, because it is involved in the sea-launched program, could achieve an earlier IOC than the ALCM–B. But there are other factors involved. One of them is modifications to the B–52.

The Air Staff, in putting this program together, took into account the availability of B–52 production, they also took account of the risk associated with too much acceleration.

General Slay. [Deleted.]

Mr. Smith. I think we will get into that in August. That is a subject of special interest.

Senator McIntyre. Was this IOC for the long-range cruise missile established because of the threat requirement or did the present development status of either of the missiles affect the IOC?

General Slay. I will attempt that. That was the earliest I could possibly certify to Dr. Perry that IOC was feasible, March of 1980.

Mr. Smith. Is the IOC determined by military requirements, Dr. Perry? Is there a threat that it would be so imposing to the B–52 force at that point that it must be overcome with this new configuration?

Dr. Perry. We do not anticipate the threat from the Soviet air defense to have increase dramatically by 1980, but neither is the limited initial operational capability going to be much of a response to a threat. We probably are focusing on the wrong date in this limited IOC. The real question is, when will we have a capability to significantly augment our bomber force with cruise missiles?

[Deleted.]

Senator McIntyre. Could an earlier IOC be established if the competitive program was not followed through full-scale development?

General Slay. In my opinion, no. Captain Locke might want to qualify that.

Captain Locke. Well, we just listed all the factors before, one of which is [deleted].

Mr. Smith. Is there a difference between you and the General on this point? You said, General Dynamics on Tomahawk could meet an IOC earlier than——

Captain Locke. General Dynamics missiles could meet an IOC in the summer of 1979 [deleted].

Mr. Smith. A qualified weapon system off B–52's at 1,000 feet?

Captain Locke. Yes; and it would be a high risk program. You asked can it be done? It can be done at high risk, and for that matter by the fall of that year at high risk, Boeing could be ready with an ALCM–B. [Deleted] it would cost you more than our current projections now, not so much in the research and development but more money into production. You would need more money than $104 million for production this year, to achieve that early IOC. Of course,

you will need more money in a production competitive environment, because of the two contractors.

General SLAY. [Deleted.]

Senator MCINTYRE. What benefits, General, are expected, or Captain Locke, are expected to be attained from a full scale engineering development program?

Captain LOCKE. I am not too sure I understand that question.

Mr. SMITH. A competitive full-scale development program.

Captain LOCKE. In the past, to cite what we did before we were able to compress the schedule because of the competition, we were able to achieve lower cost because of competition, also I think we had a better product because I was able to make recommendations to the contractors without telling them you must do it this way, I could say we would like to improve the survivability and, therefore let's [deleted] I didn't tell them how to do it, I told them what was desirable and they exceeded our expectations in [deleted]. The same thing occurred with the guidance system. Expectations were exceeded because of the competitive environment.

Had we, for example, gone with the company that originally developed TERCOM, we would not have seen the accuracies we have today but it probably would be three times greater inaccuracy.

Mr. SMITH. Those were advanced development tasks. Can you perhaps provide for the record other comparable central systems that were competed through full-scale development that would be good models as precedents? There is no need to do it now.

Captain LOCKE. I will do it for the record. I would like to make one comment. One of the noticeable characteristics of this program is innovation. If I don't find any, I don't think that would make any difference.

[Additional information follows:]

Both the design to price EW suite and the UTTAS helicopter programs were programs completed through full-scale development.

Senator MCINTYRE. Earlier testimony has indicated that it was expected that the engine and warhead on the ALCM and Tomahawk were common and that the project office was driving toward 75 percent commonality in the guidance system. This was intended to drive toward production line commonality of these missiles.

If you achieve this production line commonality then there remains very little for competing contractors to drive for in competition. The danger exists primarily of "buy-in" by one of the contractors.

Do you want to comment on that, Mr. Secretary or General?

Dr. PERRY. I think I would refer that to the program manager.

Captain LOCKE. Buy-in, first, might be one of the arguments taking them through full-scale development. You can't buy in when you have to go through five to seven initial operational test flights with SAC crews. We are going to see the real missiles out there, not any buy-in. We will be able to provide real missiles, so I don't think we will see a buy-in when we have a flyoff on full-scale development.

What was the first part of the question?

Mr. FOSTER. Regardless of the development effort, in assurance of getting a quality price, the price is going to have to be established in price competition.

Captain LOCKE. Yes, sir.

Mr. FOSTER. The price will have to be established at the end by the department, and the danger of a buy-in exists when you only have 30 percent or 25 percent of the missile costs for the contractor to work with. It seems to me that is something that should be considered strongly in this case.

Captain LOCKE. The 25 percent you are talking about is related to the engine.

Mr. FOSTER. The 25 percent is the only area that wouldn't be common to both missiles?

Captain LOCKE. The airframe will be completely different between the missiles.

Mr. FOSTER. We were told earlier 75-percent commonality was trying to be achieved between the missiles.

Captain LOCKE. That is in the engine. I think we have a misunderstanding here. For example, the engine is 70 to 75 percent hardware common now, the difference is related to the differences between the two airframes. The guidance is about 50-percent hardware common, 75-percent cost common. The engine, which is GFE, and the guidance, which is Government furnished hardware and has already been established.

We are talking about an airframe that hasn't been established. So it is really the airframes that are competing and perhaps the software and systems integration costs.

Senator MCINTYRE. Captain Locke, has the Defense Department thoroughly studied this problem from a cost effective viewpoint; and is support readily available that will demonstrate substantial cost savings from this competitive development program?

Captain LOCKE. We won't know what the cost savings will be until we get to the end. We just proved that the last competition between General Dynamics and Vought paid off. Competition between McDonnell-Douglas and E-Systems paid off. I think that every time we have gone into a competition, the Defense Department and the taxpayer gained from it. They end up with a better product in less time, and it saves money at a lower cost and we know what we are buying.

Mr. SMITH. Was that your recommendation last fall in preparation for DSARC related to having competition between the two cruise missile programs?

Captain LOCKE. No sir, I didn't make a recommendation last fall, I conducted a study, I ended up with the result of the study but I wasn't asked for a recommendation, and therefore did not make one.

Mr. SMITH. Didn't you review at that time whether competition should have been continued between Boeing and General Dynamics? Wasn't it your conclusion that they should have been consolidated into one program?

Captain LOCKE. I had a different point of view last fall. I thought in terms of Tomahawk alone, because I was the Tomahawk program manager. But now I am program manager for both of them, I think at this stage of the game our best interest is to have a competitive flyoff rather than to make a decision based upon some paper studies that we have done so far.

Dr. PERRY. We can supply you background relating to that. I would like to point out that to a certain extent, it represents a management

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judgment, that a competitive flyoff approach is an effective management tool in managing large programs. It happens to be the management judgment of all the witnesses today. We are not taking the line somebody told us to take. We independently believe that to be true. It is not a view shared by all people who have managed defense programs, though, and it will be difficult to find precise proof that demonstrates the competitive flyoff savings.

I would further add that I am, myself, expecting the benefits to be at least as great in improved performance as in reduced costs.

General SLAY. May I make a comment on perhaps an unasked question, which is nonetheless lurking below the surface?

The Air Force did not recommend competitive development last year either. We went to the DSARC with an entirely different situation. We were going to the DSARC with an intent of using ALCM on penetrating bombers. We were looking for small ALCM, as our principal weapon, as we went to DSARC. That, of course, has changed. At the time we were convinced that a short Tomahawk would require too much of a compromise to our penetrating bomber as far as total weapon carriage, for that reason, and it didn't occur to us either, the same as it didn't occur to Captain Locke. Now it is different, I have to share the view as expressed by the Secretary that competition is a good thing in this new program.

MISSILE RACKS AND LAUNCHERS

Senator MCINTYRE. Does the present planning anticipate obligating funds and spending money for development and production effort for missile racks and launchers for the B–52 cruise missile carrier for both missiles before missile selection is made?

Captain LOCKE. Not for the cruise missile carrier, but for all the rest of it.

Senator MCINTYRE. Yes, on all the rest?

Captain LOCKE. Yes, sir.

Senator MCINTYRE. Would there be advantages to limiting the use of any procurement funding for the long range cruise production until a source selection of the missile is ready to go into production?

Dr. PERRY. Let me make an answer to that and then give Captain Locke and General Slay a chance also.

I think one of the great advantages of the procurement money being spent before the decision is made is that it gives the evaluation team, the source selection team, an opportunity to get some insight into production costs before they have to make their decision. Therefore, I think it is a management technique which helps us prevent against buy-in and does relate to the question that Mr. Foster was asking earlier.

Captain LOCKE. I concur.

Senator MCINTYRE. Are the IOC dates dependent on spending procurement funding for both missiles prior to selecting a missile for production?

Captain LOCKE. Yes, sir.

Senator MCINTYRE. Acceleration of these programs, gentlemen, would indicate a significant return to the concurrency concept that was prevalent in previous programs but proved very costly, ineffective

and inefficient. A program of "fly before buy" was established to avoid, to a large degree, the "unk-unks," that had become so familiar with major development programs.

How much concurrency is now programed into this accelerated program and does this program conform to the fly before buy concept of procurement?

Captain LOCKE. Not only does it conform to it, it did conform to it. We had a fly before buy which we presented to this subcommittee. We ended up demonstrating that cruise missiles would work and were effective. As for the concurrency, the program is not accelerated that much over what we briefed you last spring.

Mr. SMITH. Excuse me. There was no TALCM program last spring.

Captain LOCKE. I am talking about a generic air-launched cruise missile. Air-launched cruise missiles, briefed last spring, talked about an initial operational capability in the summer of 1980. So there isn't that much acceleration in the program. But there is a concurrency in long lead production items that showed up then. If we don't have that concurrency, it is going to cost us more. If we go through R. & D. and then into long lead production preparation you add another 2 years onto the program. Every program that I know about has a lapover starting into production. I don't know of one program that doesn't do that in missiles. Missiles, because people can get a grip on missiles easier, they tend to get picked on more than airplanes or ships. But ships commit production dollars. Ship construction money, before you float ship 1 of a particular class. Airplanes get close to the same thing. We get very deep in the program before you have an estimate compared to what we did when we had proof of concept flight.

Mr. SMITH. Probably the best example of the problem of concurrency was the so-called Trident pacing issue in 1973 which was related primarily to submarines rather than the missile. It was this subcommittee's position that the Trident ought to be paced more deliberately, and the Pentagon ultimately came to that same conclusion. So the principle has been applied to more than missiles.

Captain LOCKE. I think this is a difficult program and it is paced. Your earlier question was could we get an IOC in 1979. That would have been a high risk program, not an orderly program. This turns out to be very much an orderly, logical program that took into account also the availability of airplanes and [deleted].

Dr. PERRY. Mr. Chairman, the acceleration of funding that we are proposing on this program is not primarily to gain an acceleration of the IOC date. It is primarily to get a competitive flyoff introduced. Therefore, it is a management technique, primarily, rather than an attempt to accelerate the IOC date.

We were asked to consider an earlier IOC date, in fact, a third quarter 1979 IOC date, and we did consider that. We are recommending, instead, this program with the Secretary of Defense's concurrence, precisely because we think it is a better managed program than one that required a third quarter 1979 IOC.

B–1 RESEARCH AND DEVELOPMENT

Senator MCINTYRE. Returning to the B–1 research and development. Mr. Secretary, is there any development effort in the B–1 program

presented in the fiscal year 1978 budget, that will not be required due to the decision to terminate production of the B–1?

General SLAY. Yes, sir, I will take that. There is development money in the fiscal 1978 budget, that was R.D.T. & E., that was related to production matters, in other words, research and development for producibility.

Senator MCINTYRE. Could you give us a dollar estimate for this?

General SLAY. May I provide it for the record?

Senator MCINTYRE. Yes.

[The information follows:]

The following tasks, which were included in the fiscal year 1978 B–1 R.D.T. & E. request, are related to production or deployment of the weapon system.

	Millions
Qualification test	$12.4
Additional structures test	7.7
Armament test	2.5
Weapon bay tank	.6
Hardening	2.1
Maintenance training equipment	5.8
Aircrew training equipment	6.0
Technical data	.4
Facilities data	.4
Operational support equipment	78.4
Total	116.3

Some of the tasks identified above may lead to technology that is applicable to other weapon systems. The Air Force is currently conducting a review of the B–1 R.D.T. & E. program to determine a recommended content. This program and cost data will be provided as soon as it is available.

Senator MCINTYRE. Has any development work effort been terminated or stopped as a result of the decision to terminate the B–1 production program? Are there any B–1 fiscal year 1977 or fiscal year 1978 funding that is not required for continuation of the development program as it now is structured and proceeding?

General SLAY. Yes sir, as a matter of fact, the day after the decision I put out a wire to our Air Force Systems Command that directed them to stop all work on all R.D.T. & E. tasks, as well as production tasks, that were directly related to production or deployment of a B–1. That was definitely in the decision that the B–1 would not be produced, so that direction has been put out.

The amount of money that is related to those tasks, I will provide for the record.

Senator MCINTYRE. When will the formal decision on the direction and alternative for continuation of the B–1 development be made?

General SLAY. I will attempt to put it in the context of the Air Force and then turn it over to Dr. Perry.

The Chief and I, just this morning, had a long discussion on that very subject. We are attempting to come to grips with a recommendation that the Chief can make to the Secretary and the Secretary in turn can make to OSD. I would hesitate to provide you a direct answer because there are so many things involved that we have to consider. Whether to build No. 4 as an example, is a very complicated decision for us because we are attempting to see what benefits we will derive versus the cost of that decision. We will however, soon be making a recommendation up through the chain.

Dr. PERRY. I would add to that: We anticipate that the issues involved are complex enough here that we do not expect to have a recommendation to you this fiscal year for modifications of the B–1 R.D.T. & E. money. What we anticipate is that early in fiscal year 1978 we will come to Congress with a reprograming request for any changes that would be required in the B–1 R.D.T. & E. program.

Mr. SMITH. One point on that, Dr. Perry. We discussed informally the other day that you may be considering FB–111 mods. There is currently no such program. Now, if one of your options is to request reprograming some of the B–1 R. & D. money and apply it to a FB–111 mod, R. & D. effort, reprograming precedents require that that not be a new start. Yet in your request you have no start-up moneys for an FB–111 program element.

Would not this be something to consider in the next 3 weeks or so, that the subcommittee might consider introducing some money into the bill, at least to give you the option, even if it is only a modest amount, so it would be a program element. Or perhaps in the report indicate that they might state that they would be willing to waive that requirement?

Dr. PERRY. Mr. Smith, the point is well taken. When we return for further testimony in August we should have enough additional information about this FB–111 proposal that we can take a position on it.

Mr. SMITH. Good.

Senator MCINTYRE. Mr. Old.

Mr. OLD. Thank you. Captain Locke, I would like to follow up on the ALCM/TALCM competition, and I understand that at this early point all these dollar figures are a little soft and subject to change, and so forth, and that the important thing is to get the program competition underway. However, having talked with your staff people and the Air Force people it is difficult for me to understand how, if the AGM–86 line is carried out through the nine full scale development flights, and AGM–86 wins, that is an estimated $338 million. On the other hand, if the AGM–109 goes out to that same point it would be an estimated $169 million. It is practically twice as much for the ALCM over the TALCM.

How is it you come up with that?

Captain LOCKE. You have to recognize that the TALCM is a delta on top of a Navy program for the sea launched Tomahawk.

Mr. OLD. Yes.

Captain LOCKE. ALCM–B doesn't have that same base to respond.

Mr. OLD. Well, maybe then it would be more helpful if there were some sort of a comparative basis to start with at the beginning of the program so that we would have a better feel for what the total expenditure is going to be.

Are you telling me that when you get the ALCM up to speed the total investment for the two, whichever was the winner, would probably be about the same?

Captain LOCKE. Probably. I couldn't answer that without adding all that up. I am really telling you those are estimates and the contractors may come under that in a competitive environment, but at any rate we need the money for the first year.

Mr. OLD. The TALCM contractor apparently says he needs $103 million for the TALCM, and the ALCM contractor apparently says he needs $174 for the ALCM. These are both contractor estimates?

Captain LOCKE. No, sir, they are not contractor estimates. Those are Government estimates. The contractor estimates would be less than that. They are in a selling mode now and until they sign their name to an estimate we can't trust it.

Mr. OLD. Well, $103 million is a Government estimate?

Captain LOCKE. It is a Government estimate. It not only includes what we are considering of Boeing and General Dynamics but also from Williams Research to support these programs, guidance from McDonnell Douglas and Government costs to run the tests and planning.

Mr. OLD. I may be mistaken but I thought the staff was told that the TALCM line was strictly a contractor estimate and had not been massaged yet, so to speak, by the program office.

Captain LOCKE. I don't know what the staff was told on that. That is just not the case.

Mr. OLD. Well, maybe you could make a clarification for the record on that particular point. Would you please do that?

Captain LOCKE. Yes, sir.

[The information follows:]

The breakout of the $103 million is as follows:

Design and fabrication	$22.0
B–52 mech mods	2.2
Support (organization and intermediate)	8.8
System test	5.9
Integrated logistics support	9.2
Guidance	23.8
Engine	14.2
Other Government costs	16.9
Total	103.0

These costs are government estimates which were extrapolated from rough order of magnitude contractor estimates of what would be required to develop an air launched version of the Tomahawk. More definitive contractor estimates will be available after each contractor has been formally asked to make contract proposals by the Air Force. These detailed estimates will be source selection sensitive.

Mr. OLD. And the second point is would you make some attempt to provide an explanation in the record of why one of these programs appears to be costing twice as much as the other. Would you try that?

Captain LOCKE. Yes, sir.

[The information follows:]

The TALCM is a derivative of the Tomahawk Weapon System developed by the Navy and Air Force for Submarine, Ship, and Ground Launch. The cost associated with TALCM are a delta to the basic development costs of Tomahawk and represent only those costs associated with the development and test of an Airborne System. The TALCM is approximately 90 percent common to the Tomahawk. ALCM on the other hand is a single development program which has only the Air Launched mission to support its development costs. For example, in fiscal year 1978 engine and guidance costs are approximately the same for the two systems while the remaining R. & D. costs are 130.9 for ALCM and 65.0 for TALCM. If there were no Sub, Ship, or Ground Launched programs for the Tomahawk development, costs of the TALCM might approximate those of the ALCM.

Mr. OLD. Thank you. Dr. Perry, you indicated in your informal discussions that you expected the B–52 to be able to penetrate through the mid-1980's, like 1985, and beyond that point you would see how it went, and as long as it appeared to be an effective penetrator it would still remain in the force.

Is that a fair assessment of your position on the B–52?

Mr. PERRY. That is a fair assessment.

Mr. OLD. Now the ASALM IOC is going to be accelerated to [deleted] according to General Slay's earlier statement this year, and as qualified today with later information [deleted].

Dr. PERRY. General Slay was indicating a potential for the ASALM.

Mr. OLD. I am just stating that as a statement of fact, that that kind of planning factor for the [deleted].

Dr. PERRY. It could be available by [deleted] on the funding profile that was presented, but all we are presenting is really the amount of fiscal year 1978 funds that would keep that option open.

Mr. OLD. And your position on the B–52, you are kind of solid, yes, about its ability to penetrate through 1985?

Dr. PERRY. I would want to elaborate, Mr. Old, that that date is strictly dependent on how the Soviets respond with their air defense. When I stop at 1985, I am simply saying that I lose my ability to predict what will happen to the air defense much beyond that point.

Mr. OLD. Well, I am wondering what the role of the ASALM is after the B–52 is no longer an effective penetrator?

Dr. PERRY. [Deleted.]

Mr. OLD. [Deleted.]

Dr. PERRY. [Deleted.]

Mr. OLD. Is that going to be an operational feasible thing to do for a cruise missile carrier, to get that close?

Dr. PERRY. [Deleted.]

Mr. OLD. [Deleted.]

General SLAY. [Deleted.]

Mr. OLD. In order to be effective, for that [deleted].

Dr. PERRY. That is correct. And moreover, as General Slay pointed out earlier, the [deleted].

Mr. OLD. Thank you. Dr. Perry, referring now to the cruise missile carrier, for which the Department is requesting $90 million with a planned IOC of March 1981, is that still a valid——

Dr. PERRY. I don't understand the question, Mr. Old.

Mr. OLD. Well, I am looking at one of the data sheets that came over indicating that the cruise missile carrier was looking for a full operational test in February 1979 with a planned IOC of March 1981.

Dr. PERRY. I am sorry, Mr. Old, I am not——

Mr. OLD. Is that accurate data?

Dr. PERRY. I don't think that is correct. I am not sure what data is being referred to. Do you know, General Slay?

General SLAY. No.

Dr. PERRY. No plan I have seen envisions a cruise missile carrier being available anywhere near that early.

Mr. OLD. I will read for the record a document brought over, I believe it was by Mr. Walsh, and briefed to the staff, and I quote: "Included in this request is an estimated $40 million for purchase of a commercial wide bodied aircraft demonstration of cruise missile carrier capability and demonstration launch would occur in July 1979, leading to full up operation tests in February 1980 with planned IOC of March 1981."

Mr. WALSH. Let me answer that. These are papers I had brought over in a preliminary form. At the time there was some question

raised as to the validity of that particular date. In fact, our subsequent deliberations disclosed to us that the date had gotten into those papers inadvertently. It was just a mistake.

Dr. PERRY. Let me be explicit.

Mr. OLD. I appreciate that in the hurriedness of which these things were being put together, some of these dates might not now be valid. Let's go back and see which of the dates are in fact valid. Will there be a demonstration launch in July of 1978?

General SLAY. Mr. Old, I would be hard pressed to certify to that right now. I don't know. We haven't gotten that far into the system. We have seen letters from one of the potential contractors that says we can do it next Tuesday. We have seen others that say we would like to take a more step by step approach. We have not evaluated it, and as I tried to make clear, I certainly would not want to put the Air Force on record on any schedule before we have looked at it, and we really have not looked at it.

Mr. OLD. Well, that makes all the other dates kind of academic, doesn't it?

Dr. PERRY. Mr. Old, I would like to make a distinction. The programs, schedules and dates projected for our cruise missile programs have had careful consideration and, we believe, are quite firm. The program dates for the cruise missile carrier are not firm. We do not have a clear program plan on that and we cannot give you at this time confident dates on any of those landmarks.

Mr. OLD. Normally, dates and moneys are somewhat related and it is just kind of interesting now that none of these dates are valid whether or not that $90 million is required in order to proceed with what you want to proceed with here. Could you make a comment on that?

Dr. PERRY. I guess my comment is that I cannot defend an operational date or even a first launch date for cruise missile carrier at this time.

The funding describes, the funding assumed a test program next year which involved buying a cruise missile carrier, not yet specified, modifying it, and conducting flight tests. The $90 million was an estimate of what it would cost to do that. Beyond that, we do not have detailed program plans.

Mr. OLD. But when this initial paper was made up somebody threw $90 million against this cruise missile carrier and they threw three dates in here. There was some bearing between the money and the dates. Now, there are no dates. Now it seems to me the money might be in excess.

Dr. PERRY. Those dates represented one person's view of what could be done. Our management view of the issue is that we cannot commit to those dates at this time. We might be able to give a better figure on that in the August hearings.

Mr. OLD. I think that would be very helpful.

I will just conclude with one further question, and that is, will this be a competitive selection?

General SLAY. I will attempt to answer that. If I have anything to say about it, it would certainly be a competitive selection. I know for sure there are three contractors frothing at the mouth to be aboard.

I would think it would be wrong not to take advantage of that atmosphere.

In maybe a little amplification of what Dr. Perry said, we have had AFSC take a preliminary look at this total program and the results were as you saw. They did nothing in attempting to validate dates. They are attempting to do that now, and I hope within the next few weeks, certainly before Dr. Perry comes back here in August, that we will have a reasonably firm program schedule.

Mr. OLD. Thank you, Mr. Chairman.

Senator MCINTYRE. All right.

Well, I guess that will bring us to the close. John Walsh indicated to me this morning that this would probably be his last appearance for some time. He is on his way to Brussels for a new assignment in NATO. I do think that as a Deputy Director of Defense Research and Engineering for the Strategic Space Systems, John Walsh's testimony before this subcommittee has always been of the highest interest. We have had some disagreements, that I think is to be expected. But I do appreciate your service to the department and the subcommittee and we certainly all wish you well in your new job.

Mr. WALSH. Thank you very much, Mr. Chairman.

Senator MCINTYRE. Dr. Perry, I want to express the subcommittee's appreciation for the efforts you, General Slay, and the Department have made to provide us with as much information as possible in the short time you have had since the supplemental was introduced. I also appreciate your having provided the subcommittee with the bomber modernization study.

Although you and your colleagues have been most cooperative, I think we all recognize that there simply has not been enough time for a deliberate review of some of the elements of this supplemental bill even by the Department, let alone by this subcommittee. This is to no one's discredit. It is simply a reality defined by the calendar and the clock.

The subcommittee is therefore faced with three choices. We could recommend substantial reductions in the supplemental because of the incompleteness of the record. Or we could recommend support of the supplemental in spite of the incompleteness of the record. Either of these alternatives run against the grain of the tradition of this subcommittee over the last 8 years to insist on high quality decision-making in the areas of its responsibility.

So, there is a third alternative which I propose to follow, and I am sure that Senator Goldwater and other members of the subcommittee are in agreement. Let us work during the recess to review this supplemental and the questions it raises further. By the end of next week we will submit to you, Dr. Perry, a set of written questions and ask that you respond in writing by the close of business August 17. One week later, on August 24, we will reconvene hearings and receive further testimony from other witnesses, including ERDA on the W–80 warhead, and, if possible, from the Commander in Chief of the Strategic Air Command. We will also ask you and your team to return to respond to more systematic questioning based on your testimony this week, the materials you have provided, and your written responses to our interrogatories.

I am confident that this additional work during the recess will give us the basis for recommendations to the full committee. We will, therefore, reconvene the subcommittee on Tuesday, September 6, at 4 p.m., immediately upon the reconvening of the Senate. Assuming that the subcommittee will be able to complete the actions then we will be ready to report to the full Armed Services Committee the morning of Wednesday, September 7. This should enable the committee and the Senate to move expeditiously, but on the basis of a complete record and on the basis of a vigorous, independent review.

So with that, we will recess until August 24.

[Whereupon, at 1:05 p.m., the subcommittee was adjourned, to reconvene on Wednesday, August 24, 1977.]

APPENDIX A

Questions Submitted by Senator Thomas J. McIntyre

Questions submitted by Senator Thomas McIntyre to Dr. William J. Perry, Director, Defense Research and Engineering, Department of Defense, to be answered for the hearing record.

[The questions, with answers supplied, follow:]

Question. What is the total program cost estimate for the long range ALCM program? How many production missiles does this consider and are these quantities sufficient for both the B–52 carrier as well as the cruise missile carrier?

Answer.

ALCM:

Development	$343.4
Procurement	2,305.2

These figures are based on Procurement of 2,328 missiles for the B–52 only, and do not include the approximately $1.8M per aircraft for B–52 modification or the $297M sunk into the TALCM program prior to ALCM selection.

Question. When would the first ALCM long range missile flight be possible under the accelerated program being requested?

Answer. February 1979.

Question. When would the ALCM long range missile be sufficiently developed to have a basis for making a competitive selection with the TALCM missile for full scale engineering development?

Answer. All development and demonstrations will be completed by August 1979 with the source selection decision by November 1979.

Question. Are there development funds in this ALCM program that are planned to be used for development of a new launcher rack or pylons for the long-range cruise missile?

Answer. Yes.

Question. Data provided to the committee staff indicated that $25.5 million or about 15 percent of the $173.9M requested would be used for systems management. Why would this funding requirement be so high and what effort can be expected for these dollars?

Answer. Systems management includes such areas as systems engineering, quality control, program planning and control, test planning, logistics planning, and configuration control. The percentage is considered reasonable for these areas for a development program.

Question. Will the ALCM missile require a cannister for launch such as the TALCM is expected to require? Please explain why the TALCM would require a cannister for air launching and what cost and effort would be required to improve the TALCM to be able to be launched without cannisters as the ALCM?

Answer. The final missile configurations on launch concept for the Cruise Missile Carrier have not been determined. These issues will be evaluated and resolved early in the Cruise Missile Carrier Program. The present concept of launch from a B–52 does not require a cannister for TALCM.

Question. Are there any development or production advantages or disadvantages to directing the ALCM program primarily toward the long-range missile rather than the short range missile?

Answer. The DSARC II approved program directed the Full Scale Engineering Development of both ALCM–A (short range) and ALCM–B (long range) with the ALCM–B development to have priority. Program direction to go only with the ALCM–B allows total Boeing ALCM management and engineering expertise to focus on a single airframe with its particular ejection and flight characteristics rather than being split between the two air vehicles. Production line complexities are similarly simplified.

Question. Are the funds of $103 million requested for the TALCM development program required to support the IOC date?

Answer. $103M in fiscal year 1978, $98.2M in fiscal year 1979, with $28.2M to complete are the TALCM funds required to support a [deleted] IOC.

Question. If no funds can be reduced from the $103 million requested for TALCM because of the Project Office analysis of contractor proposals or the revision of the IOC for the competitive development program, please provide a comparative expenditure plan for the TALCM missile as proposed for the [deleted] IOC with the expenditure plan for the present IOC?

Answer. [Deleted] IOC for a B–52 Cruise Missile Weapon System is not considered feasible since neither the [deleted] nor the B-52 modifications would be available. Furthermore, dependence on a single missile concept at this point is considered too great a risk to accept given the importance of Cruise missiles to National Defense.

Question. What is the total program cost estimate for the long range TALCM program? How many missiles does this consider in the production effort? Does this consider sufficient missiles for a B–52 carrier as well as a separate cruise missile carrier?

Answer.

TALCM:

Development	$229.4
Procurement	2,305.2

These figures are based on procurement of 2.328 missiles for the B–52 only and do not include the $1.8M per aircraft for B–52 modification or the $409M sunk into the ALCM prior to selection of the TALCM.

Question. What kind of a missile rack is being considered for the TALCM missile and what development costs are included in this request for the rack?

Answer. The TALCM contractor has proposed a nine-position stack type rack for the B–52 bomb bay. The fiscal year 1978 request includes $7.3M for the rack development.

Question. Why should development funding be expended in this budget for technical manuals for the TALCM missile until there is assurance that this missile will be selected and will be in operation by the user?

Answer. Each contractor will be evaluated on the logistics and maintenance requirements of their proposed weapon system to ensure that source selection considerations will be given to life cycle costs.

This requires both competing contractors to demonstrate how their weapon system will perform in the entire operational cycle (including the logistics and maintenance portions) including an evaluation of the adequacy and thoroughness of technical manuals.

This does not include nor does the DOD intend to procure operational quantities of these items until after the winning missile has been selected.

Question. Why should development funding be expended for ground support equipment for the TALCM missile until it can be determined which missile will be selected for production?

Answer. Each contractor will be evaluated on the logistics and maintenance requirements of their proposed weapon system to ensure that source selection considerations will be given to life cycle costs.

This requires competing contractors to demonstrate how their weapon system will perform in the entire operational cycle (including the logistics and maintenance portions) including an evaluation of the required ground support equipment.

This does not include nor does the DOD intend to procure operational quantities of these items until after the winning missile has been selected.

Question. What is the date now established as the initial operating capability (IOC) of the long-range cruise missile and how was this date determined?

Answer. A limited initial operational capability consisting of one B–52 with six production missiles is scheduled for [deleted]. This date is the earliest practical date for an IOC which is contingent on the development of the cruise missile air vehicles and the nuclear warhead having progressed through initial operational test and evaluation (IO T. & E.) and subject to production article availability for a limited deployment.

Question. What acceleration does this IOC date require from each candidate missile and what are the projected costs of the acceleration?

Answer. The [deleted] IOC requires an acceleration of approximately four months. It is anticipated that the forces of competition will be more than adequate to preclude any cost increases due to acceleration.

Question. Has a cost correctiveness study been performed to determine if this acceleration cost is efficient in relation to the requirement and the risk associated with the acceleration?

Answer. As stated earlier, we feel that the cost increases due to program acceleration will be made up thru competition. Program risks are minimized by having the competitive flyoff conducted prior to contractor single-up. Both contractors will be required to fly their missiles in an operational environment before the full production decision is made.

Question. Did the earlier planning and cost data presented to the committee anticipate an earlier IOC for the long-range cruise missile?

Answer. Earlier planning and cost data presented to the committee reflected some of the initial considerations and options as to how the B–52 cruise missile program should proceed. IOC's in [deleted] were considered but were rejected as not providing a solid test demonstration upon which to make such a major decision. These earlier IOC's of the cruise missile would also have preceded the availability of both the nuclear warhead and B–52 modifications.

Question. Is the IOC date controlled in any way by launcher capabilities?

Answer. The full IOC coincides with the availability of the first B–52 updated in the B–52 Avionics update program.

Question. Does the IOC that is now established anticipate a competitive full-scale development program of both the ALCM and TALCM missiles?

Answer. The [deleted] IOC assumes a competitive full scale engineering development (FSED) program for both ALCM and TALCM with a winner chosen in November 1979 to finish FSED and proceed into production.

Question. Why was the determination made to have a full-scale competitive development program for these long-range cruise missiles?

Answer. The increased importance of long-range cruise missiles to National defense, mandated adoption of a low risk development program. It is felt that a competitive full scale engineering development program would optimize the choices available to the government between schedule, technical performance and costs and provide the government with the greatest insight into these areas before committing to a single approach.

Question. Will any technology achievements be gained from the competitive development program or is this primarily an engineering task?

Answer. Both ALCM and TALCM need to accomplish what now appears to be rather straightforward engineering tasks during the flyoff. The ALCM has yet to be modified to its long range or ALCM–B version while TALCM needs to demonstrate its performance from the B–52 flight envelope.

There is opportunity in both programs for technology achievements in the areas of reliability, maintainability and producibility. Both programs will be required to demonstrate that the most cost effective production materials and techniques are to be utilized and that the contractor possesses both ability and inclination to control production and maintenance costs.

Question. What are the total projected program costs to continue a competitive development program for both of these missiles? Consider all development and production costs as well as other costs connected with the B–52.

Answer. The proposed competitive program is:

	Millions
Development	$544.6
Procurement	2401.0
Total	[1] 2945.6

[1] Does not include the required B–52 modifications which are approximately 1.8M per aircraft.

Question. What would be the comparable projected costs for this cruise missile program if a competitive selection of a missile was made before the full scale development program was started and only continue the development program with the winning missile competitors?

Answer. A paper competition could be conducted and source selection made based on contractor proposals with the flyoff. This approach however could create unacceptable levels of cost, schedule and technical risks for such a critical program. Comparable projected costs would result by eliminating the R&D and FY78 and FY79 production costs for one of the two missiles.

Question. When under the competitive development program as now planned would the selection of the missile to go into production be made?

Answer. By November 1979.

Question. Does the present planning anticipate obligating funds and spending money for production effort for both missiles until a missile selection is made?

Answer. Yes.

Question. How much development and production funding will be obligated for efforts directed toward production delivery, operation and maintenance of two missiles prior to selecting a missile for production?

Answer. Approximately $243 million has been requested for production funding prior to selection of a design. The exact amount that will be obligated by that point has not been estimated to date. No funds will be obligated for actual operation and maintenance prior to the selection of a flyoff winner. However, as a part of the competitive flyoff, each contractor will be required to develop and demonstrate items normally associated with production such as technical manuals and Ground Support Equipment. This requirement is in consonance with the Government's desire to select the system with the best performance and supportability for the lowest life cycle cost.

Question. How many test hours and flight tests are programmed for each cruise missile? How many of these test hours and test flights will be accomplished prior to obligating any procurement funds for these cruise missile programs?

Answer. Ten test flights are planned for each missile prior to source selection with nine flights after to complete the FSD program. This amounts to about 100 hours for each missile during the ten competitive flights. Approximately 136K ground test man hours and no flight test man hours will be accomplished prior to obligating funds for procurement of missiles.

Question. Are the IOC dates dependent on spending procurement funding for both missiles prior to selecting a missile for production?

Answer. Yes. The only other alternative would require a substantial increase in R&D funding to keep the winning contractor's team alive until full procurement funding was available. This would delay the limited IOC approximately eighteen months.

Question. Acceleration of these programs would indicate a significant return to the concurrency concept that was prevalent in previous programs, but proved very costly, ineffective and inefficient. A program of "fly before buy" was established to avoid to a large degree the "unk unks" that have become so familiar with major development programs. How much concurrency is now programmed into this accelerated program, and does this program conform to the "fly before buy" concept of procurement?

Answer. The proposed program conforms directly to the "fly before buy" concept of procurement. Prior to single up, both contractors will have to demonstrate not only how well their missile performs in an operational environment but also requires each contractor to have demonstrated his capabilities and performance through the stages of advance or preliminary production. This approach provides valuable insight as to how well each contractor can transition from a development program into full production before full commitment to a single weapon.

Question. The fiscal year 1978 budget included about $145.6 million for program development tasks such as flight test, qualification testing, development and training equipment and support equipment. Included in this funding is $78.4 million for operational support equipment, $5.8 million for maintenance training equipment; $24.8 million for qualification testing and other items. In view of the decision to terminate the B–1 program, is it necessary to continue development effort in these areas?

Answer. The Air Force is currently examining the development options available on the B–1 program. They range from completion of the planned R.D.T. & E. program in order to completely protect an option to go into production on the B–1 to outright termination of the development program. We will review these options and the Air Force recommendations when they are submitted.

The development of equipment necessary to deploy the aircraft, such as the operational support equipment and maintenance training equipment which you mentioned, would be among the first items to be eliminated from the R.D.T. & E. program for fiscal year 1978 if we decide to proceed with less than a complete R.D.T. & E. program. They could be accomplished concurrently with a production restart if that becomes necessary. This does not mean that all of the funds associated with these tasks are not needed. Due to the reduction in the contractor's

business base engendered by the discontinuation of the production program, overhead in the R.D.T. & E. will increase making each remaining task more expensive.

Question. Are there any program development tasks in the fiscal year 1977 effort that also would not be needed due to the termination notice?

Answer. The Air Force has stopped work on the deployment related R.D.T. & E. tasks which were on contract on June 30th when the President's decision was made. These tasks included the development of operational support equipment, technical data and facilities data. The Air Force has not yet received the proposal from the contractors for this program restructuring. The dollar value of these tasks was not high and cancellation occurred late in the fiscal year so I would not expect that the stop work will realize a large amount of money.

Question. What are the development costs for continuation of the B–1 development program for each of the alternative development programs that have been developed and presented to the Air Force?

Answer. As I mentioned earlier, a number of options have been presented to the Air Force and are now under consideration. There are five general options under consideration: termination on September 30, 1977 which would require $80 million over the R.D.T. & E. funds authorized and appropriated for fiscal year 1977; a program that phases out the B–1 flight test program in December 1977 and tests the defensive avionics system on a B–52 or C–141, which would require $225 million over the funds already available; a program that continues flight testing until the end of 1979 and tests defensive avionics on B–1 Aircraft #3 for $434 million; a program which continues planned flight testing including defensive avionics on Aircraft #4, which would require $735 million; and a program with Aircraft #4 that develops an enhanced defensive avionics system for $933 million. Some variations of these programs have also been proposed but these are the basic options.

Question. You indicate that the cruise missile could be developed to fly faster and lower with even detectability. What general range of figures are you referring to?

Answer. Let me answer this question in two parts. First we discussed the ongoing efforts in advanced research that are leading towards the design of supersonic cruise missiles. Through the use of ram jet technology we can envision velocities of [deleted]. The particular concept is the integral rocket ramjet where the missile is carried to high speed after launch by a solid fuel rocket. After reaching high speed, the solid rocket fuel chamber is now used for the combustion chamber of the ramjet which provides thrust for the duration of the flight.

In the area of reduced radar cross sections, there has been considerable R. & D. effort for the past few years. There are efforts now that are looking at particular ways of [deleted].

Question. With a reduced number of B–52s planned for penetration, how do you handle the required megatonnage on target problem? Can this deficit be made up with Cruise missiles?

Answer. Many area targets require high yield weapons to achieve desired damage levels. In terms of EMT, the replacement of a [deleted]. However, on hard targets, the accuracy of the Cruise missile offsets the reduced megatonnage. With current B–52 bombing accuracies, for example, the [deleted] Cruise missile, delivered against a hard target with [deleted] accuracy, is essentially the same as a [deleted] free fall delivered with [deleted] accuracy against the same target.

QUESTIONS SUBMITTED BY SENATOR BARRY GOLDWATER

Supplemental questions submitted by Senator Barry Goldwater to Dr. William J. Perry, Director, Defense Research and Engineering, Department of Defense, to be answered for the hearing record.

[The questions, with answers supplied, follow:]

Question 1. Dr. Perry, in your cover letter to Senator McIntyre enclosing the Strategic Bomber Force Modernization Study, you state that it was one of the analytical inputs given the Secretary to assist him in his decision process and was not intended to represent a Department position.

What other analytical inputs were provided the Secretary to assist him in his decision?

Since you state that this document does not represent a Department position, what documents are, in fact, available that do represent a Department position?

Answer. The Strategic Bomber Force Modernization Study and the Joint Strategic Bomber Study were the two principal analytic inputs to the Secretary of Defense to assist him in his decision. The one document that does represent the Department position on this matter is the prepared statement of the Secretary of Defense for his appearance on August 2, 1977 before the House Armed Services Committee.

Question 2. The SecDef, in his press conference of July 1, indicated that this proposed course of action will save many billions of dollars over the B–1. Can you provide the Subcommittee with the cost data that supports the Secretary's statement?

Answer. We estimate cost reductions for strategic forces will amount to about $10B in the six year period fiscal year 78–83. Over the six year period, the acquisition cost and operating and support costs for a pure B–1 force of [deleted] aircraft would be about $15 billion in fiscal year 78 dollars. A comparable cost for a force of B–52s, with [deleted] cruise missiles on part of that force, would be about $5 billion in fiscal year 78 dollars.

Question 3. The SecDef stated in his press conference that the B–1 would have been a more attractive option had it been 30 percent less expensive. Are you aware of what weight the Secretary gave to the cost of the B–1 program in making his recommendation? What study efforts did the Department engage in to see whether or not the B–1 program could have been restructured to meet this objective?

Answer. I am not aware of what particular weight the Secretary of Defense gave to the cost of the B–1 in making his recommendation. From his statements on the matter, we can conclude that B–1 cost was not the primary consideration. He has stated that: "My recommendation to the President, and his decision, not to proceed with production of the B–1 were based on the conclusion that aircraft carrying cruise missiles will better assure the effectiveness of the bomber component of U.S. strategic forces in the 1980s. . . . The cruise missile is clearly going to be more penetrable (sic) over long distances than a large manned aircraft. . . . That is why this seems to me a better and not merely a less expensive way to go."

The Department did not engage in any specific study effort to see whether the B–1 program could have been restructured. We did conclude that a new bomber program would not result in any significant cost savings relative to the B–1.

Question 4. Who in the Department of Defense made the determination as to the Steering Group members and its Chairman, consultants to the Chairman and the working group members?

Answer. Secretary Brown tasked the following to accomplish this study: Secretary of the Air Force; Joint Staff; Director Defense Research and Engineering; Assistant Secretary of Defense (ISA): Director Defense Intelligence Agency; and Director Planning and Evaluation. He selected the consultants and designated the Director, Planning and Evaluation to chair and coordinate the effort.

Members of the Study Steering Group were selected by the principals tasked to accomplish the study. Similarly, working group members were designated by the chairman and other steering group members.

Question 5. What was the basis for choosing the individuals who were designated as consultants to the Chairman? What is the particular background or expertise of these three gentlemen that caused them to be selected as consultants?

Answer. The consultants to the chairman were selected by Secretary Brown because of their particular background, expertise and familiarity with national defense. Specifically,

Mr. Paul Ignatius—past Secretary of the Navy and Assistant Secretary of Defense for Installation and Logistics. Currently President, Air Transport Association.

Dr. Ivan Selin—past Acting Assistant Secretary of Defense for Systems Analysis, Principal Deputy Assistant Secretary of Defense for Systems Analysis and Deputy Assistant Secretary of Defense (Systems Analysis) for Strategic Programs. Currently Chairman of the Board, American Management Systems.

Dr. Herbert York—past Director, Defense Research and Engineering. Currently a professor with the University of California at San Diego.

Question 6. What was the relevance of having individuals as panel members who normally work in International Security Affairs?

Answer. As a member of the staff of the Secretary of Defense, the Assistant Secretary of Defense for International Affairs (ISA) advises the Secretary in the formulation of Defense policy, particularly, with respect to Strategic Arms Limitations (SALT) negotiations.

The ISA staff representative provided considerations about how the various force modernization alternatives might be viewed under present limitations and as points for discussion in future talks.

Question 7. For the record, provide a brief biography of each of the working group members with particular emphasis on their previous experience in dealing with strategic issues.

Answer. The biographies are as follows:

Mr. Terrence J. King

1970–Present: Director, Strategic Forces Division, Office of the Assistant Secretary of Defense (Program Analysis and Evaluation).

1973–1974: Contributor, Joint Strategic Bomber Study.

Maj. Lee Taylor

1974–Present: Staff Member, Strategic Forces Division, Office of the Assistant Secretary of Defense (Program Analysis and Evaluation).

1973–1974: Operations Analyst, Strategic Bomber Division, Assistant Chief of Staff, Studies and Analysis, Headquarters USAF. Contributor, Joint Strategic Bomber Study (Interceptor effectiveness and mobile SAM excursions).

1970–1971: Graduate Student—M.S., Defense Systems Analysis, University of Rochester.

Cmdr. John Schrader

1973–Present: Staff Member, Strategic Forces Division, Office of the Assistant Secretary of Defense (Program Analysis and Evaluation).

1972–1974: Doctoral Student—Ph. D., Operations Research, Naval Post Graduate School.

1970–1972: Strategic Program Analyst, Strategic Analysis Support Group, Office of the Chief of Naval Operations.

Maj. Joseph Arena

1973–Present: Staff Member, Cost and Economic Analysis Division, Office of the Assistant Secretary of Defense (Program Analysis and Evaluation).

1970–1973: Cost Analysis Officer, Directorate of Budget, Headquarters, USAF.

Mr. Robert Bott

1975–Present: Staff Member, Strategic Forces Division, Office of the Assistant Secretary of Defense (Program Analysis and Evaluation).

1973–75: Program Analyst, Technical Plans Office, Navy Strategic Systems Project Office.

Col. Charles Hopkins

1974–1977: Chief, Strategic Forces Branch, Office of the Joint Chiefs of Staff.

1973–1974: Deputy Chief, Aerospace Doctrine Division, Headquarters, USAF.

Col. F. G. Thomas

1972–Present: Military Assistant, Office of the Director, Defense Research and Engineering (Strategic and Space Systems).

1973–1974: Contributor, Joint Strategic Bomber Study (Chairman, Launch Survive Task Force).

1971–1972: Assistant Director and Commander, U.S. Army Ballistic Missile Defense Agency.

Mr. Willard Mitchell

1976–Present: Deputy Director, Force Planning and Analysis, Policy Plans and National Security Council Affairs, Assistant Secretary of Defense (International Security Affairs).

1970–1975: Assistant for Asia and Assistant for Strategic Analysis and Long Range Planning, Assistant Secretary of Defense (International Security Affairs).

Mr. James Bebe

1976–Present: Assistant for Force Planning and Analysis, Assistant Secretary of Defense (International Security Affairs).

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1973–1976: Staff Member, Institute for Defense Analysis Author/Co-author of several strategic force analyses.

Col. J. E. Scholz

1976–Present: Assistant Chief and Chief, Strategic Bomber Division, Assistant Chief of Staff Studies and Analysis, HQ USAF.
1973–1974: Contributor, Joint Strategic Bomber Study (force effectiveness modeling and calculations).
1972–1974: Operations Analyst and Branch Chief, Penetration and Analysis Branch, Strategic Bomber Div., Assistant Chief of Staff Studies and Analyst, HQ USAF.

Dr. Peter Scop

1975–Present: Branch Chief, Command and Control Branch, Defense Intelligence Agency, Principal Scientific Representative on Soviet Strategic Air Defense.
1970–1975: Staff Member and later Group Leader in Studies of Soviet Strategic and Tactical Air Defense—Mitre Corp.

Mr. Edwin Potter

1976–Present: Analyst, Directorate for Estimates, DIA.
1973–1976: Analyst, Office of Strategic Research, CIA.
1971–1973: Analyst, Office of National Estimates, CIA.
1970–1971: Analyst, Directorate for Estimates, DIA.

Col. Thomas Radke

1977–Present: Deputy Director, Strategic Offensive & Defensive Studies, Assistant Chief of Staff Studies and Analysis, Heaquarters, USAF.
1974–1976: Assistant Chief and Chief, Strategic Bomber Div., Assistant Chief of Staff Studies and Analysis, Headquarters, USAF.
1973–1974: Chief of Avionics Division, Director of Aerospace Requirements, Headquarters, SAC.
1970–1973: Chief of Bomber Navigation, Guidance Branch, Director of Aerospace Requirements, HQ SAC.

Question 8. Dr. Perry, what is the major conclusion of the Modernization of the Strategic Bomber Force Study?

Answer. The study did not present conclusions but rather presented factual data, estimates and analysis. The major conclusion which I drew from the study—and other source material—was that a mixed bomber force consisting of penetrating bombers and cruise missile carriers was the preferable future bomber force.

Question 9. Dr. Perry, describe the sequence of events; that is, the tasking and direction from the Secretary of Defense that led to the preparation of the staff study on the Modernization of the Strategic Bomber Force. What was the date of the initial request by the Secretary of Defense for this study?

Answer. On 29 January 1977, Secretary Brown tasked the Secretary of the Air Force (Chairman); Joint Chiefs of Staff; Director Defense Research and Engineering; Assistant Secretary of Defense (ISA); Director Planning and Evaluation; and the Director Defense Intelligence Agency to accomplish a Strategic Bomber Force Modernization Study.

In his tasking, Secretary Brown requested that the study review "the threat which drives the design requirements of a modernized bomber force, the alternatives for countering this threat, and the alternatives designed to satisfy our mission requirements."

Question 10. Dr. Perry, I note the study provided the Committee dated April 29, 1977, was carried as a draft copy. Has there been any change in this document since April 29, 1977? Please submit an unclassified copy of the study for the record.

Answer. There have been no changes to the document since April 29, 1977. An unclassified version of the study can be provided, if required but would not be useful due to expurgation necessary for declassification.

The declassified version is attached in response to the subsequent request for the document:

STAFF STUDY FOR THE SECRETARY OF DEFENSE

Modernization of the Strategic Bomber Force

CONTENTS

Strategic Bomber Force Modernization Study

Steering Group Members

E. C. Aldridge, Jr., Chairman—Director, Planning and Evaluation
Mr. John Walsh—Deputy Director, Defense Research and Engineering
Dr. Lynn Davis—Deputy Assistant Secretary, International Security Affairs
Brig. Gen. Emil Block, USAF—Special Assistant for B–1 Matters, U.S. Air Force
Brig. Gen. R. W. Anson, USA—Assistant Deputy Director for Force Development and Strategic Planning, Office of the Joint Chiefs of Staff
Mr. Gordon Negus—Defense Intelligence Officer for Strategic Forces and SALT

Consultants to the Chairman

Mr. Paul Ignatius—President, Air Transport Association
Dr. Ivan Selin—Chairman of the Board, American Management Systems
Dr. Herbert York—University of California at San Diego

Working Group Members

Mr. Terrence J. King, ODP&E Chairman—Col. F. G. Thomas, ODDR&E
Maj. Lee Taylor, ODP&E—Mr. Willard Mitchell, ISA
Cmdr. John Schrader, ODP&E—Mr. James Beebe, ISA
Maj. Joseph Arena, ODP&E—Col. Thomas Radke, Air Force
Mr. Robert Bott, ODP&E—Col. J. E. Scholz, Air Force
Col. Charles Hopkins, OJCS—Dr. Peter Scop, DIA; Mr. Edwin Potter, DIA

This report could not have been prepared without the patient and tireless assistance of Miss Mary Jane Mullendore, Mrs. Helen Kirby and Mrs. Linda Curl.

INTRODUCTION

Strategic Bomber Force Modernization Study

The purpose of this study is to review plans to modernize the U.S. strategic bomber force, and in particular the current plan to procure the B–1. The study reviews the assumptions of the Joint Strategic Bomber Study (JSBS) of September 1974 as a point of departure, and reassesses our bomber force modernization options in terms of:

The most recent assessment of the Soviet threat.
The lastest cost information.
Updated force effectiveness data.
Their potential impact on Soviet forces.

The study treats the bomber force modernization options in two phases:

First, a number of alternatives are compared on a cost-effectiveness basis in order to sort out the most attractive options. The alternatives are examined in terms of how differing assumptions about system performance, in the face of uncertainty about the effectivenss of the Soviet air defense system, drive the choice of alternatives.

Second, the most attractive options are selected for further consideration in terms of alternative bomber forces we could have by the mid-1980s. Illustrative production/deployment rates are considered in this part of the study.

The JSBS results were obtained from detailed simulations using the Advanced Penetration Model (APM). Based on the initial suspense established for the completion of this report, the study group determined that no further APM simulation could be undertaken. Therefore, since the JSBS threat is roughly equivalent to the [deleted] this threat formed the basis for the cost-effectiveness analysis. However, the cost-effectiveness presentations in this study (as contrasted with specific results) cover the full spectrum of threat possibilities and are independent of the particular threat judgment.

The PRM–10 study, "Comprehensive Net Assessment and Military Force Posture Review" due for completion by June 15, 1977, is evaluating overall strategic force objectives, strategic nuclear targeting policy, the TRIAD concept, and the force requirements which derive from various strategic objectives, targeting policies, and TRIAD postures. The PRM–10 study is noted in pertinent places in this report.

The potential impact of current SALT issues on our force modernization options is also evaluated.

The B–1 has had a highly successful development program. The testing history and performance data indicate that it is a technically sound program. The major B–1 uncertainty at this time is total program cost, which is a politically sensitive issue (this is discussed in Appendix C). The Congress has approved production for the first three aircraft in fiscal year 77, and the current status of the B–1 procurement plan is:

Aircraft procured:

Fiscal year 1977	3
Fiscal year 1978	5
Fiscal year 1979	13

The timetable for making key decisions on the B–1 program is as follows:

Go/No Go Decision on Production (fiscal year 1977–79 budgets include tooling for 2 aircraft per month),[1] by June 1977.

If Go, Decision on Rationale for Production Rate/Force Level Plan (current FYDP plan shows buildup to 4 per month production rate and procurement of 240 aircraft), now or defer?

Rate Tooling Above 2 Aircraft Per Month, by December 1978 (fiscal year 1980 budget).

[1] If a decision is made before June 30, 1977, termination costs would be limited by contractual provisions. The current obligation plan is as follows:

[In millions of dollars]

	February	March	April	May	June
Per month	85	92	100	115	125
Cumulative	226	319	418	533	657

SECTION I. OVERVIEW OF U.S. STRATEGIC FORCES

A. Planned Force Structure

The currently approved DOD funding profile for strategic forces, the force structure which is consistent with that funding, and details of the currently planned bomber force structure are shown in Charts 1a, 1b, and 1c. (The charts reflect the impact of the recent program budget decisions by the President and the Secretary of Defense.)

Based upon the data in the charts, it can be seen that:

Strategic offensive forces spending has declined since the 1960s, when we procured most of the strategic delivery vehicles which are operational today, to a fairly level rate in 1970–1976. Strategic offensive spending will rise from about $7.5 billion in fiscal year 1976 to about [deleted] in fiscal year 1982 assuming we go ahead with Trident, the B–1, and MX as planned—i.e., assuming we modernize the forces procured in the early 1960s in accordance with the February 1977 FLDP schedule.

With a constant level of MIRVed ICBM launchers and an expanding MIRVed SLBM force, we reach a level of 1320 MIRVed launchers [deleted] We also reach a level of 2400 strategic nuclear delivery vehicles [deleted] as the B–1 is deployed. This can only be accomplished by retaining all active B–52s as 244 B–1s are deployed, thus increasing the size of the bomber force.

Soviet strategic forces have expanded dramatically since the mid-1960s.

The average age of U.S. versus Soviet strategic forces in [deleted]—even with planned modernization—favors the Soviets.

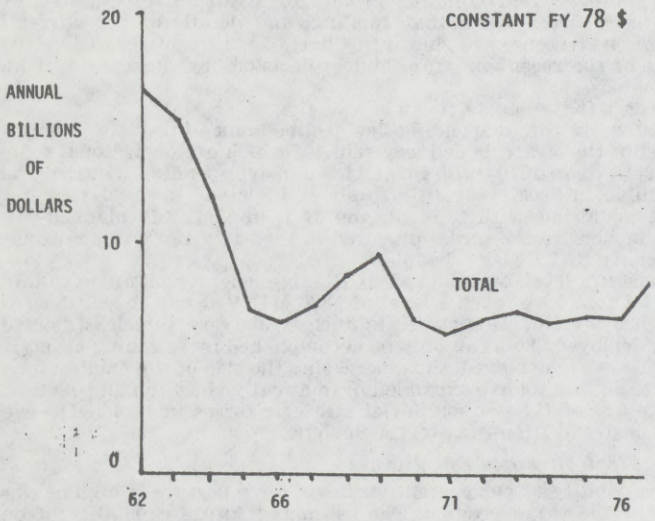
B. Trends in U.S. Strategic Force Effectiveness

The estimated capability of our current strategic force posture is high against most components of the target system. The estimated future capability of our strategic forces will be affected by the following:

Projections of an improving Soviet threat to the effectiveness of U.S. forces: new accurate ICBMs, expending and improving air defenses, improving antisubmarine warfare forces, and extensive development effort on advanced ABM systems.

Uncertainties about the impact Soviet force improvements are expected to have on the survivability of the Minuteman force (assuming it is not launched out from under an attack), the penetration capability of the existing B–52 and FB–111 force, and arrival rates of ballistic missile RVs should the Soviets abrogate the ABM Treaty and begin deployment of an extensive ABM system.

STRATEGIC OFFENSIVE FORCE
DIRECT OPERATIONS - SYSTEM ACQUISITION COSTS (U)



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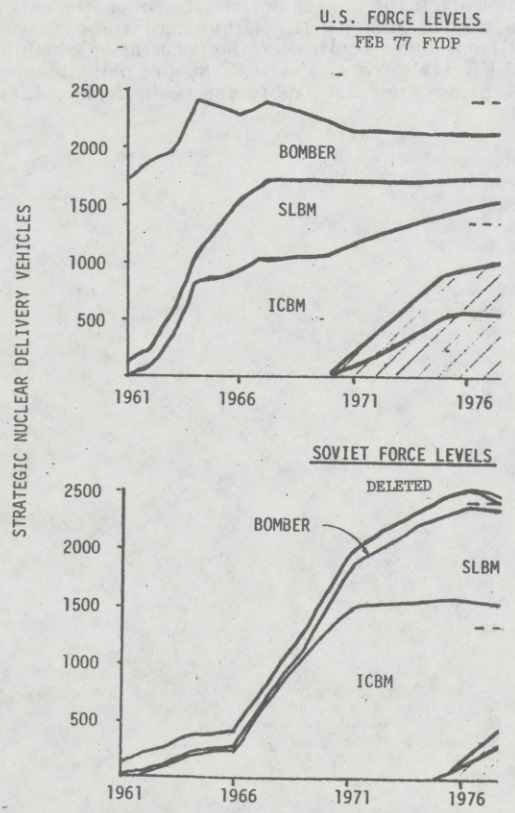
* Current FYDP over-funds estimated MX procurement requirements in FY 81 and under-funds estimated FY 82 requirements.



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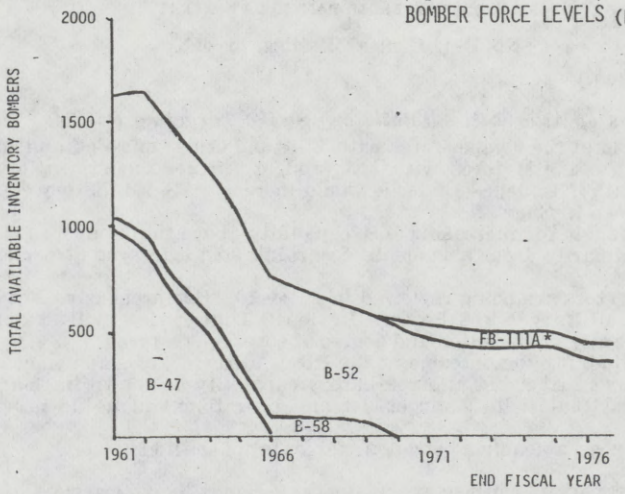
CURRENT AND FUTURE STRATEGIC BOMBER FORCE LEVELS (U)



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* FB-111 not included in SALT SNDV levels.
** FYDP bomber levels

The degree of possible Soviet passive defense measures and their potential impact on our retaliatory capability.

Uncertainty regarding public and Congressional acceptance of the MX mobile-based ICBM and the ELF communications system for SSBN command and control.

SALT II agreement provisions and the effect these provisions may have on the size, mix, and capability of future forces.

Despite these uncertainties, we can make projections of our current and future retaliatory capability based upon best estimates of weapon system performance against a projected threat, although such projections vary significantly as our assessments of system performance and threats vary.

A projection of our current and future second strike capability in terms of target destruction potential from our day-to-day alert force posture is shown in Chart 2a. This chart shows that through [deleted].

No cruise missile, B–1, or MX deployment, but continuing Trident–I. Minuteman, and other force improvements as planned.

That our weapon systems perform according to our estimated planning factors, i.e., current and projected estimates of B–52/FB–111 weapon arrival rates; Minuteman survivability per the "Best" NIE–76 projection of the Soviet ICBM force and Soviet CEPs; no threat to the at-sea SLBM force; no unexpected technical difficulties; and no Soviet technological breakthroughs or treaty abrogations.

No change in the composition or the size of the target base.

Residual Soviet capability reflects the relative target destruction potential of Soviet forces, as projected in the NIE "Best" estimate, following a pre-emptive first strike on U.S. strategic nuclear forces.

[Deleted.]

U.S. SECOND STRIKE CAPABILITY TO DESTROY REPRESENTATIVE ECONOMIC/MILITARY TARGETS [1]

[Chart deleated.]

U.S. DAY-TO-DAY ALERT POSTURE SOVIET PRE-EMPTIVE STRIKE ON U.S. STRATEGIC NUCLEAR FORCES

[1] This chart shows relative capability between Soviet and U.S. forces using the February 1976 National Target Base. The [deleted] level represents destruction [deleted] of the economic target value in the Soviet target base and [deleted] of the non-silo military target value in the Soviet, Warsaw Pact and PRC target base. The data shown are from a theoretical employment of weapons and the target destruction goals do not correspond to the goals nor options mandated by NUWEP. [Deleted.]

STRATEGIC FORCES COMPOSITION

RETALIATION FROM DAY-TO-DAY ALERT

No B–1, Cruise Missiles, or MX

[Chart deleted.]

C. Implications of Alternative Retaliatory Strike Targeting Policies

Modernization of the bomber force with B–1s and cruise missiles, and /or modernization of the ICBM force with MX, and/or further modernization of the SLBM force with a Trident–II missile would increase U.S. retaliatory capability above that shown in Chart 2a.

The rationale for increasing U.S. capability above that shown in Chart 2a derives primarily from arguments regarding strategic system performance factors.

These factors are being reviewed in PRM–10, "Comprehensive Net Assessment and Military Force Posture Review." That review will examine the target base size, composition and degree of coverage required.

Without prejudging the outcome of the PRM–10 review of employment policy, and given today's target list and retaliatory capability as shown in Chart 2a, it should be noted that today's target list and operational plans do provide for [deleted].

Policy guidance for acquiring strategic forces is not specific.

SECTION II. BOMBER FORCE MODERNIZATION ALTERNATIVES

The major alternatives for modernizing the bomber force, should we decide to do so, are described below primarily in terms of their weapon-carrying capacity. The aircraft options are shown drawn to scale in Chart 3. Some refueling from KC–135 tankers is required for all alternatives.

A. Penetrating Bomber Alternatives

1. B–52 (Current and Improved)

The current B–52G/H bombers could continue to be used as they are today—i.e., as a penetrating force. These B–52s (151 unit equipment (UE) B–52G's and 90 UE B–52Hs) can each carry a maximum of 8 SRAMs and 4 gravity bombs internally on a mission in which the bomber penetrates Soviet territory at low altitude [deleted]. However, the average weapon load throughout the alert force would be [deleted] when all mission flight profiles and target locations are considered.

The current B–52G/H force could also be modified with four new high-bypass engines in place of the existing 8 engines and be given added fuel capacity (a B–52 (I). In this configuration, the B–52 (I) range/payload capability would be improved such that it could carry a full internal load of 12 weapons to a greater distance.

With some further modification, a B–52 (I/CM) could, on most missions and with some additional tanker support, carry cruise missiles externally to be launched [deleted] when all mission flight profiles and target locations are considered.

Further modification of the B–52 (a B–52X) could include, in addition to the re-engining and added fuel, a bomb bay lengthened to permit carriage of [deleted].

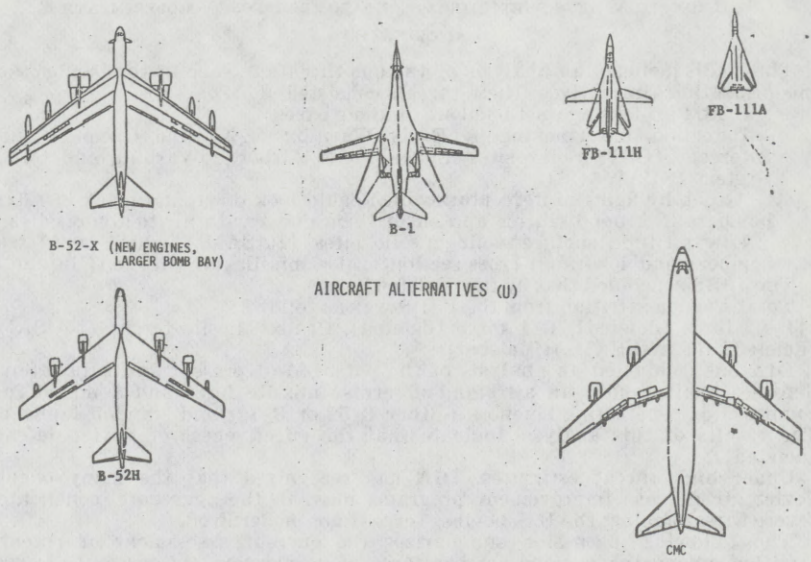
The B–52 (I) and ICM were considered and dismissed when it was found they were not competitive alternatives. Instead, the B–52X was carried forward.

2. FB–111H

The FB–111A design could be modified ("stretched") such that a new production FB–111H configuration could carry an average alert load of [deleted] on the "A" model. With two B–1 engines and added fuel capacity, the "H" model would also have increased range and be able to carry an improved ECM package.

3. B–1

Although the B–1 can carry as many as 24 weapons internally, its average load based upon all mission flight profiles and target locations would be [deleted].



AIRCRAFT ALTERNATIVES (U)

4. B–X

Studies conducted since the B–1 entered engineering development have confirmed that a penetrating bomber should have the same characteristics that are designed into the B–1. They include low operating cost, high speed, high probability of launch survival, high probability of air defense penetration, and versatility in weapon loading. There have been no advancements in technology since the B–1 design was frozen that would significantly increase the probability of placing weapons on target if such advancements were utilized, The B–1 has been designed with the growth capability to accommodate avionics changes. If technological advances are found in the future which provide higher probabilities of placing weapons on target they could be incorporated into the B–1.

By the end of fiscal year 1977, approximately $3.2 billion will have been spent in the development of the B–1 weapon system. If a new bomber were to be designed, a significant portion of this amount representing the B–1 design, evaluation and fabrication would be essentially lost and a like amount would have to be spent to bring the new bomber to the same point in development that the B–1 has already reached.

B. Stand-Off Bomber Alternatives

1. Cruise Missiles on B–52's

The B–52G/Hs could be modified to carry 20 cruise missiles (8 internally/12 externally) of about [deleted]. The B–52 in this configuration could fly from CONUS to launch points outside the Soviet Union and then land at forward bases or return to CONUS. Some sorties would not require tanker support if the missions are flown at high altitude.

2. New Cruise Missile Carrier (CMC)

A wide-bodied commercial aircraft (747 or DC–10) could be configured to carry cruise missiles and operate in the stand-off mode described above. A 747-type aircraft could carry about [deleted] cruise missiles; however, the ability to carry [deleted] cruise missiles assumes (a) successful development of the W80 warhead with insensitive HE to avoid the safety hazards implicit in carrying that much nuclear material in one vehicle, and (b) that intrinsic radiation from the material is not a hazard to crew or maintenance personnel.

C. Mixed Force Alternatives

The penetrating and stand-off options can, of course, be considered individually as candidates or be combined into a mixed force of stand-off and penetrating bombers.

SECTION III. THE SOVIET THREAT AND BOMBER FORCE MODERNIZATION ALTERNATIVES

The JSBS included an analysis of various threats to each of the bomber force modernization alternatives. These threats consisted of:

SLBM attacks against bombers on their bases.

Detection and tracking by Early Warning (EW) and Ground Control Intercept (GCI) radar sites and a Soviet Airborne Warning and Control System (SUAWACS).

Attack by fighter interceptors which could look down and track low flying bombers in ground clutter and shoot them down with air-to-air missiles.

Low altitude surface-to-air missile sites (LASAMs) which could track bombers and low-radar-cross-section cruise missiles at [deleted] in clutter.

The JSBS concluded that by the [deleted].

Total weapon attrition from the PSBS was as follows:

B–52 force [deleted], B–1 force [deleted], Cruise Missile force: (No SAMs) [deleted], (Fixed SAMs) [deleted].

DIA has conducted an analysis of the potential of present and future Soviet defenses against both an all stand-off cruise missile force and a mixed force composed of penetrating bombers (either B–52 or B–1s) and standoff launchers. The results of this analysis indicate that the effectiveness of Soviet defenses [deleted].

Under high threat estimates, DIA has recognized that the many ongoing Soviet air defense improvement programs may, in the aggregate, constitute a severe threat against the U.S. bomber force if not modernized.

The following discussion summarizes the current assessment of potential attrition among the various bomber force modernization options and discusses the major areas of disagreement among the members of this study. Attrition factors are important because they form the basis for the relative attrition ratios between cruise missiles and bombers and among bomber alternatives, which in turn is of major significance in deriving relative cost-effectiveness comparisons.

A. Attrition to SLBM Attacks Against Bombers on Their Bases

If we assume, as was shown in the JSBS, that Soviet SSBNs (20 of a total of [deleted] were to be on patrol 200 NM from the U.S. coast in the Atlantic and Pacific Oceans and the Gulf of Mexico, and were to fire missiles [deleted] around U.S. bomber bases, the U.S. bomber/tanker force options could be attrited as follows. (Results assume bombers are re-based at interior bases and SAC receives warning [deleted].

	B–1	FB–111H	B–52G/H	CMC (747)	KC–135
Attrition (percent of alert force):					
Normal trajectory	[Deleted.]				
Depressed trajectory	[Deleted.]				

The assumed SSBN patrol patterns are something the Soviets could begin to do within a short leadtime—say over several months.

[Deleted] the U.S. force alternatives would have to be extensively re-based toward interior CONUS bases and away from current bases which are near U.S. coasts.

There is a consensus within DOD that the attrition calculations noted above are essentially valid.

B. Attrition to Fighter Defenses

Soviet air defenses today are [deleted] in their ability to defend against air-to-surface missiles and bombers attacking at low altitudes—that is, altitudes lower than [deleted] feet. These include:

1. [Deleted] gaps in low altitude EW/GCI radar coverage, [deleted] the Soviets could overcome many of the current technical deficiencies in their capability against low-altitude bombers.

1. *Detection and Tracking Network (EW and GCI Radars and SUA WACS*

[Deleted] the Soviets are projected to have over surveillance and tracking radars deployed at over [deleted].

a. *Tracking of Bombers.*—[Deleted.]

[Charts deleted.]

It should be noted that subsequent models of cruise missiles may provide much more difficult targets for the air defenses to detect, track and destroy than the current first designs.

2. SUAWACS

The Soviets could develop an AWACS with a look-down capability over water [deleted] and one with an overland look-down capability by the [deleted].

This fleet of AWACS probably could achieve good detection and tracking capabilities against bombers or stand-off carriers within its coverage. The Air Force believes AWACS maximum detection range against Cruise missiles would be [deleted].

3. Fighters

Except for the Flogger, current Soviet interceptors have virtually no capability to attack targets flying below the interceptors altitude. The Flogger has a [deleted] radar search and track capability, a 23mm gun, and air-to-air missiles [deleted].

The Soviets are believed to be working toward systems having better low-altitude attack capabilities than those on Flogger.

[Deleted.]

Another system is projected which could have more advanced look-down/shoot-down capabilities, similar in some respects to those of both the F–14 and F–15. Thus, [deleted] Soviet interceptors could have some degree of low-altitude attack capabilities, ranging from those of Flogger to those associated with F–14's and/or F–15's.

The range of estimates concerning potential fighter capability is as follows:

	Fighter capability		
	Look down detection range (NM)	Vectoring	Kill potential per engagement
Bombers:			
Effective ECM:			
DIA	[Deleted.]		
JSBS			
Ineffective ECM:			
DIA			
JSBS			
Cruise missiles:			
DIA			
JSBS			

In view of the large uncertainties concerning EW/GCI and fighter effectiveness, a range of estimates about bomber and cruise missile attrition to fighter defenses for forces of the size considered here could be as follows:

	Percent weapon attrition due to fighters			
	B–1	FB–111H	B–52	Cruise missile
Low-moderate threat (~F–16 quality)	[Deleted.]			
Moderate-high threat (~F–16 to F–14 quality):				
Effective ECM				
Ineffective ECM				

C. Attrition to SAMs

1. SAM Effectiveness

a. *SAMs vs. SRAM.*—It appears that the high speed [deleted] feet per second) and very low radar cross section of the Short-Range Attack Missile (SRAM) will [deleted].

b. *Current SAMs vs. Bombers and Cruise Missiles.*—Current Soviet SAMs (SA–1, SA–2, SA–3 and SA–5) at fixed locations are readily avoided by low-flying bombers.

With regard to cruise missiles at [deleted] feet per second and with a very low average radar cross section, [deleted]. Because cruise missile radar cross section will increase with aspect, cruise missile vulnerability must be addressed for cross sections exceeding the nose-on value.

The Air Force, additionally, recognizes the Soviet potential to upgrade current SAM systems. The various modifications [deleted] to the SA–2 illustrate Soviet ability to improve existing systems.

c. *Future SAMs.*—[Deleted.]

Because it appears to be technically feasible to develop a SAM which could engage low altitude cruise missiles deployment requirements, production capabilities, system integration, human factors, readiness, peacetime operational experience and demonstrated wartime performance of Soviet weapons.

[Deleted.]

2. *SAM Deployment Modes*

The manner in which LASAMs will be deployed also impacts significantly on the relative and absolute effectiveness of the LASAM against both bombers and cruise missiles.

[Deleted.]

a. *LASAMs in Terminal Defense Deployments.*—[Deleted] analysis has shown that LASAMs deployed in a terminal defense mode to protect Soviet economic and military installation [deleted] could provide defensive coverage as follows:

[Deleted.]

Percent[1] Aimpoints Within LASAM Coverage

(Theoretical Maximum)

LASAM Engagement Range [Deleted].

Number of Sites (Deployed in USSR) [Deleted].

The LASAM sites were assumed to be deployed on the outer edges of Soviet industrial and military clusters. One or more sites per cluster were required depending upon the assumed engagement range of the LASAM and the size of the cluster. The distribution of sites among the economic and the military clusters was done [deleted].

The percentages of coverage in the preceding table are theoretical upper bounds, under the stated assumptions, since siting constraints around the target clusters were not considered, and actual deployments could be far different from those assumed depending upon Soviet judgments as to what targets may be attacked.

b. *LASMs in Barrier or Area Deployments.*—If LASAMs are deployed in a barrier or area type defense they could impact [deleted] depending on the number and assumed effectiveness and the tactics and ECM employed by penetrators.

[Deleted] an indication of the attrition such a system might cause if deployed at unknown locations in a barrier defense around the western approaches to the Soviet Union or in an area defense through the Western Soviet Union is shown in Chart 5.

[Deleted.]

In sum, the disagreement among the members of this study regarding the Soviet threat to the U.S. bomber force is in the following areas:

Attrition Caused by Fighters

1. [Deleted.]
2. [Deleted.]
3. [Deleted.]

Attrition Caused by LASAMs

1. [Deleted.]
2. [Deleted.]
3. [Deleted.]

D. Soviet Reactive Defenses to Bomber Modernization Alternatives

Estimates of Soviet air defenses for the 1980s reflect projections of technological advancement, production capability and priorities, identified deficiencies, and intelligence on doctrinal and operational practices. However, the estimates also reflect possible reactions to planned U.S. strategic forces—currently planned to be composed of penetrating bombers with a weapon mix of air-to-surface missiles and gravity bombs.

[1] Percent of total Soviet economic and total Soviet/Pact/PRC military aim points in the target base [deleted].

ALTERNATIVE MOBILE SAM DEPLOYMENTS

[Chart deleted.]

SRAM carriers would remain the greatest threat to Soviet SAM defenses with or without modernization of the bomber force and Soviet SAM defenses [deleted].

The Air Force notes that the projections described above account for a Soviet reaction to modernization of the *penetrating* bomber force, and that the Soviet reaction to U.S. reliance solely on penetrating cruise missiles could significantly impact the effectiveness of such a cruise missile force.

1. *Extended area defense*

Assuming U.S. deployment of stand-off cruise missile carriers only, a reactive Soviet defense can be postulated that includes suitable current systems with and without modification, new systems already projected to be operational in the 1980s, and system redeployments to better exploit system capabilities. [Deleted.]

The present and projected Soviet ground-based air surveillance network is incapable of detecting aircraft at high altitude beyond about [deleted]. Thus, long range warning and control will depend upon airborne warning and control systems (AWACS). [Deleted.]

The present MOSS/FLAT JACK system is inadequate; since it was introduced about 10 years ago [deleted.]

The Soviets are expected to have as many as [deleted] fighters with combat radii approaching [deleted] without loiter at high altitude [deleted]. Some of these fighters would also have capabilities against low-altitude aircraft.

	High projection (a/c)	Combat radius (w/ext fuel)	Medium-high altitude radar search/ track range (nautical miles)
Foxbat Flogger Advanced interceptor	[Deleted.]		

Thus, the Soviets could have the number of fighters necessary for a forward defense. In addition, the DIPP high estimate includes deployment of fighters [deleted].

(*a*) *Loss of target coverage.*—An extended defense perimeter employing long-range fighters (see Charts 6 & 7) could reduce cruise missile target coverage, restrict the number of available stand-off launch areas, and cause the U.S. to resort to a longer range cruise missile or force some amount of carrier penetration of the extended defense perimeter.

[Deleted.]

The JSBS did not examine the impact of Soviet air defense deployed solely against an all standoff cruise missile carrier force. Target coverage are shown below for cruise missiles launched outside three possible defense perimeter deployments:

[Charts deleted.]

Further, even if such defenses were established, their effectiveness could be degraded by changes in the offensive forces. These judgments are based on a number of important factors regarding the evolution of Soviet defensive forces, including developments in air surveillance and control, interceptor aircraft, and long-range operations.

(*b*) *Attrition due to penetration of extended area defenses.*—Should the cruise missile carriers attempt penetration of the extended area defense postulated above to gain back lost target coverage, the Air Force believes that attrition to cruise missiles could be expected as shown in Chart 8 [deleted].

Possible inclusion of ECM on a CMC to aid in penetrating an extended area defense has not been analyzed due to the unavailability of technical and cost data.

The Air Force analysis also shows that extended perimeter defenses, if employed against a penetrating force, could cause about [deleted] attrition to B–52's and [deleted] attrition to B–1's.

[Deleted.]

A COMPARISON OF THE B–52 CMC AND CMC 747 PENETRATING AN EXTENDED AREA DEFENSE [1]

[Chart deleted.]

They would also have to re-deploy a large number of interceptors and operate a large proportion of them in the severe far-northern environment—an environment which inhibits effectvie full-time operations.

Further, the AWACS and fighters would have to avoid defense suppression and, in many cases, operate efficiently within contested areas such as the Adriatic, Mediterranean, and North Sea, and the Sea of Japan.

Over the longer term, [deleted] risk to a stand-off force with [deleted] cruise missiles could increase. The number of AWACS aircraft could increase and longer range interceptors could be introduced. However, the U.S. almost certainly would become aware of any such increase in Soviet defensive capabilities long before the new systems could be widely deployed. Thus, there would probably be sufficient time for the U.S. to develop tactics to overcome the postulated longer term defenses and, depending upon the changes required, there might also be sufficient time to develop new systems.

[Deleted.]

2. *LASAM's*

The Air Force believes the SA–3, SA–6 and SA–8 are SAM systems [deleted].

[Deleted] the number of new SAM's and the design features required for a good defense would depend on whether the U.S. deploys an all stand-off force or a mixed force composed of cruise missiles and penetrating bombers:

The number required for a good defense against an all stand-off force would be [deleted] SAM sites.

[Deleted.]

The electronic design requirements [deleted] would be increased significantly if bomber ECM is anticipated.

Because of these severe requirements, [deleted]. However, over a longer term, the Soviets could satisfy these requirements if they are willing to accept much higher costs in rubles and manpower.

DP&E, DDR&E and the Air Force believe that an effective defense against an all standoff force [deleted] (see Chart 5).

E. Total weapon attrition

A quantitative summary of the impact of the major arguments and uncertainties discussed above upon the overall attrition to be expected for the various bomber force modernization alternatives is presented in Charts 9a and 9b.

In all cases, an allowance is made for (a) attrition from [deleted] on the bomber bases per the JSBS results; (b) weapon losses due to reliability; and (c) losses due to fuel exhaustion due in turn to tanker losses from the SLBM attack. These estimated attrition factors are:

TOTAL WEAPON ATTRITION

[Charts deleted.]

SLBM attacks	[Deleted.]
Fuel exhaustion reliability	
Total [1]	

[1] Survival probabilities are multiplied to determined attrition: 1 minus (1 minus SLBM attrition) (1 minus fuel/reliability attrition) equals total attrition. This result would be multiplied further by (1 minus fighter attrition) (1 minus barrier/area LASAM attrition) (1 minus terminal LASAM attrition) to derive the total attrition shown in Charts 9a and 9b.

1. *Low SLBM/low-moderate fighters threat*

When considering a low-moderate threat projection in which the SLBM threat is low [deleted] fighters are on the order of F–16 quality, and ECM works as estimated, Chart 9a shows that [deleted].

2. *High SLBM/moderate-high fighter threat*

When considering a moderate-high threat projection in which the SLBMs are assumed [deleted] fighters are on the order of F–15 to F–14 quality, and ECM works as estimated, Chart 9a shows that [deleted].

---

[1] [Deleted.]

3. *Cruise missile attrition to extended area defense* (SUAWACS plus long-range fighters)

The Air Force estimate of cruise missile attrition due to carrier losses in penetration of extended area defenses to maintain target coverage (as discussed in Section III.D.) is included in Chart 9a. This estimate is as follows:

	B–52/CM's		CMC–747	
	Effective ECM	Ineffective ECM	Effective ECM	No. ECM
Attrition to ext area def	[Deleted.]			

An estimate of cruise missile attrition due to CMC–747 carrier attrition with effective ECM is unavailable at this time due to the lack of technical and cost data.

4. *Barrier/area LASAM's*

When barrier and/or area LASAM's at unknown locations are considered, the P_k of the SASAM is and ECSM is assumed to work as [deleted.]

For LASAM's with a P_k of [deleted total] cruise missile [deleted] ECM works as estimated.

5. *Terminal LASAM's*

Chart 9b shows that if cruise missiles attack targets defended by [deleted] shows the attrition sensitivity to this effectiveness parameter.

6. *ECM uncertainty*

The table below compares total weapon attrition from the mod-hi threat with effective ECM (Chart 9a) to that from the same threat with ineffective ECM. The ECM factors result from incorporating the ineffective ECM attrition discussed on page 10.

PERCENT TOTAL WEAPON ATTRITION (NO LASAM)

	B–1	FB–111H	B–52	B–52/CM, EAD [1]	CMC–747; EAD
Mod-hi threat:					
Effective ECM	[Deleted.]				
Ineffective ECM					

[1] Extended area defense (EAD) as postulated by Air Force. DIA believes this defense to be [deleted].

It is clear from this comparison and the comparison of bombers with effective and ineffective ECM on Chart 5, that total attrition to bombers [deleted].

SECTION IV. EVALUATION OF ALTERNATIVES

Based upon the weapon loading and cost factors in Charts 10a and 10b and the attrition data discussed in Section III, cost-effectiveness comparisons among the alternatives can be made for a given level of effectiveness. However, it should be noted that although cost-effectiveness comparisons of the bomber force alternatives provide valuable insights into the selection of preferred alternatives, such comparisons do not provide unequivocal answers.

A. Cost-effectiveness methodology

Three assumptions which have a significant impact upon the cost-effectiveness comparisons are (a) the force alert scenario used (day-to-day vs. generated), (b) in the absence of definitive reactive threat projections into the 1990s and beyond, the use of the mid-to-late 1980's threats,* and (c) the costing period used.

Chart 11a illustrates the methodology by showing a cost-effectiveness comparison between the B–1 and B–52 with cruise missiles and the B–1 and CMC over a range of total attrition values. The curves on the chart are cost-effectiveness indifference curves—i.e., anywhere along the curves the B–1 and the cruise

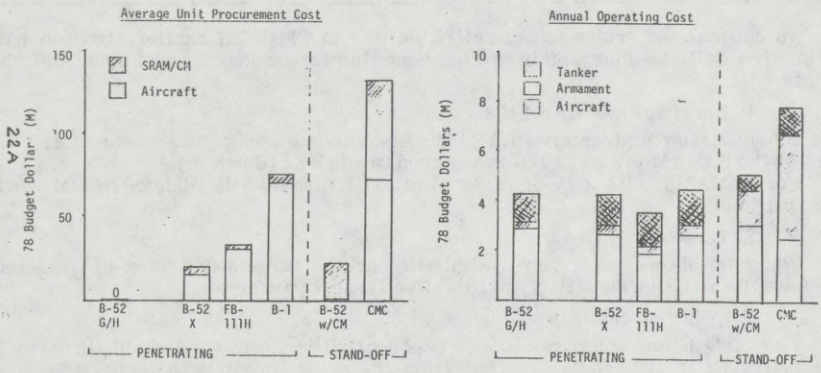
missile alternatives cost the same to achieve equal effectiveness. As indicated on the chart, the indifference curves represent use of 10- and 20-year costs.

[Deleted.]

B. Summary of cost-effective comparisons

In the following discussion, based upon the results in Appendix A, a penetrating B–1 is first compared with stand-off cruise missile forces; subsequently a penetrating B–1 is compared with penetrating B–52G/H and B–52X.

KEY COST FACTORS



KEY EFFECTIVENESS FACTORS

[Chart deleted.]

PREFERENCE REGIONS FOR PURE PENETRATING B–1 FORCES AND STANDOFF CRUISE MISSILE FORCES (10- AND 20-YEAR COST FOR EQUAL EFFECTIVENESS)

[Chart deleted.]

1. Pure cruise missile forces versus a pure B–1 force

[Deleted.]

The assumptions which would move the rectangles in Chart 11a to the region in which a B–1 force would be preferred over a cruise missile force are as follows:

[Deleted.]

2. Mixed forces of standoff cruise missiles and penetrating bombers

For the [deleted] pure forces are generally less costly than mixed forces. This is driven principally by assumptions relative to ECM effectiveness and LASAM numbers and effectiveness. Further, since a mixed force is necessarily composed of fewer aircraft of each specific type, under most scenarios procurement learning experience and the amortization of the non-recurring costs for the two bomber types making up the mixed force results in a pure force being more cost-effective. This is illustrated on Chart 11b.

PREFERENCE REGIONS FOR MIXED FORCES OF PENETRATING B–1'S AND STANDOFF CRUISE MISSILES 20-YEAR COST FOR EQUAL EFFECTIVENESS

[Chart deleted.]

[Deleted] the amount of uncertainty in the cost estimates, the relatively small added cost of a mixed force may be compensated for by the capability and flexibility which a mixed force provide. Chart 11c shows the regions of preference for mixed and pure forces for the following set of threat assumptions: [deleted].

3. *Penetrating bomber options*

The FB–111H, a conceptual weapons system, offers no cost-effectiveness advantage over the B–1 for threats and missions addressed in this study.

A comparison of penetrating B–1's versus penetrating B–52G/H's and B–52X's is shown in Charts 11d, e, and f for three cases: (1) a mixed force of cruise missiles and penetrating bombers in which the penetrators cover [deleted] of the target base (this is equivalent to an assumption of [deleted] (b) a mixed force in which [deleted] of the targets are attacked by penetrators; and (c) [deleted] the targets are attacked by penetrators.

On Charts 11d, e, and f comparisons are made between the B–52 and the B–1 as the penetrating component of a mixed force.

[Deleted.]

PREFERENCE REGIONS FOR PURE PENETRATING B–1 FORCES, STANDOFF CRUISE MISSILE FORCES, AND MIXED FORCES (COST FOR EQUAL EFFECTIVENESS)

[Chart deleted.]

COMPARISON OF PENETRATING BOMBER COMPONENTS IN MIXED FORCES

[Chart deleted.]

COMPARISON OF PURE PENETRATING BOMBER FORCES (10- AND 20-YEAR COST FOR EQUAL EFFECTIVENESS)

[Chart deleted.]

C. Mixed forces and the Soviet threat

In addition to cost-effectiveness considerations, there are two qualitative considerations regarding mixed forces and the Soviet threat.

1. *Hedging*

A mixed force of penetrating bombers and standoff cruise missiles hedges against improvements in defenses which could be uniquely effective against either bombers or cruise missiles, such as: improved Soviet ECCM; improved fighters (through dilution/saturation effects); improved SAM capability against cruise missiles; technological breakthroughs in air defense components; operational failures; and SALT restrictions or other arms limitation uncertainties.

2. *Pressing Soviet defenses*

A mixed force of standoff cruise missiles and penetrating bombers presents the Soviets with significant increases in the complexity and cost of defending against a U.S. bomber force.

(*a*) *Cruise missiles.*—A cruise misssile threat [deleted] radar cross section vehicles flying at [deleted] presents the Soviets with the following problems:

The thousands of radars in the EW/GCI net, hundreds of look-down/shoot-down fighter radars, and thousands of SAM radars must be designed—or modified—to have substantial [deleted] capability.

The design of air-to-air missiles and SAM interceptors so successfully attack cruise missiles is also complicated.

Some of the tactics required to provide an effective defense against cruise missiles would force the Soviets to adopt significant changes in current doctrinal concepts. For example, [deleted].

(*b*) *Penetrating Bombers.*—The inclusion of penetrating bombers in the U.S. strategic offensive force presents Soviet planners with:

The threat of ECM, which pushes the Soviets to increase the power and frequency agility in their EW/GCI, fighter, and SAM radars.

The supersonic [deleted] SRAM, which [deleted].

The ability of bomber crews to respond to unexpected threats pushes the Soviets to improve the performance of their air defense components or to increase the numbers of defensive systems.

The flexibility (in weapons loading) to deliver cruise missiles in addition to traditional bomber weapons, thus presenting the Soviets with a possible mixed force on a single platform.

(*c*) *In sum:*

Uncertainties in long range threat and cost estimates plus other factors discussed herein may cause one to prefer a mixed force.

The deployment of a mixed force of pentrating bombers and stand-off cruise missiles could force the Soviets to expend more technology and manufacturing

and manpower resources than ever before in an attempt to achieve effective defenses against the U.S. bomber forces.

The choice of a mixed force gives the offense improved strategic and tactical flexibility.

D. Operational considerations

Test experience to date provides confidence that the B–1 can achieve its predicted mission performance. Because of its early stage of development, we do not have this same operational confidence in cruise missile capability. Should cruise missiles perform as predicted, they would possess attractive operational characteristics when employed to complement the penetrating bomber force. Additionally, the employment of cruise missiles from B–52s will provide a cost effective solution to maintaining the effectiveness of these aircraft [deleted].

[Deleted] the employment of a combination of cruise missiles and B–1s would prevent the Soviets from constructing a defense optimized against either.

E. Target coverage considerations

Another aspect of the evaluation of alternatives is the relative ability of each alternative to cover the target system. The location of the fighter employment perimeter, the distribuion of SAM defenses, and the range/payload of the bomber force alternatives are key considerations.

A standoff cruise missile force could cover [deleted] of the target system [deleted] and could cover [deleted] of the target system from outside the coverage of an extended area defense.

F. ECM considerations

The nature of electronic warfare involves direct interaction with enemy equipment and, therefore, enemy ECCM activities impact the results. While absolute values are difficult to forecast, it is likely that some degradation of enemy capabilities will result from bomber countermeasure applications.

Strategic force planning has traditionally employed the basic concepts of defense avoidance, degradation or suppression. In this context, the goal of ECM is to prevent successful enemy attack; the Air Force expects that ECM will produce delays and confusion which will degrade the enemy's chance of success. However, countermeasures effectiveness is not easily quantified. Further discussion of Air Force views is contained in Appendix B.

[Deleted.] The evidence and rationale which support this judgment are discussed in Appendix B.

[Deleted.]

G. Other considerations

The cost-effectiveness comparison of the various alternatives for strategic bomber force modernization focused on major quantitative factors associated with the primary retaliatory nuclear mission. That comparison did not address other important factors which deserve consideration when deciding upon the course and extent of bomber force modernization. Two particularly important factors are: (1) the aging of current strategic bombers, and (2) the capability of modernization alternatives for employment in non-nuclear tasks. In addition there are some particular concerns about a wide body CMC.

1. B–52 aging

The effectiveness of the current bomber force has been achieved by continuously modifying the B–52 force to adapt to the evolving Soviet threats. However, the growth potential to economically and effectively offset future threats is constrained by a physically and technologically aging airframe. Additionally, there is uncertainty in the confidence we would place in the continued safe and efficient operation of an airframe which will be over 25 years old in the post-1985 time frame.

2. Conventional role

Although not considered in detail in this study, the conventional effectiveness of a strategic bomber is dependent upon many of the same factors which influence its primary nuclear mission capability. These factors are:

Long-range, large payload. The B–1, B–52 options and CMC satisfy this requirement. The FB–111H cannot.

Take-off performance and dispersal/deployment base requirements. The B–1 and FB–111H can satisfy this requirement. The B–52s and CMC are more limited due to runway/taxi-way/ramp and support requirements.

Penetration capability. The B–1, B–52 and FB–111H satisfy this requirement depending on the threat level. The more severe the threat, the more the B–1 or FB–111H is preferred. The use of a CMC as a bomber force in non-STOP warfare engagements would be limited to stand-off applications of cruise missiles due to the inability of the CMC to penetrate the defenses.

Of all the alternatives, only the B–1 satisfies all the requirements to maintain bomber conventional capabilities.

The B–1 program has been structured to insure a conventional capability in the post-1980 period. Its performance characteristics could permit employment in major areas of potential conflict while operating from U.S. bases. Should deployment be required, the B–1's takeoff and landing performance combined with its self-sufficiency characteristics (APU, self-test equipment, on-board oxygen generation) make operation from bases unsuitable for other alternatives possible.

[Deleted.]

3. Other considerations

A wide-bodied jet cruise missile carrier appears, from a cost-effective standpoint—under certain threat assumptions—to be an attractive bomber force candidate. However, factors other than cost-effectiveness for particular threats must be considered.

(*a*) *Concentration of assets.*—The choice of a pure CMC force could concentrate the bomber force in [deleted] aircraft. This could simplify a pre-launch attack. More importantly, it could allow the Soviets to focus their defense capabilities.

They would have the option of attempting to destroy the carrier before cruise missiles are launched and/or attempting to destroy individual cruise missiles after launch. The leverage involved between these options is [deleted]. One could conclude that such leverage would invite a dedicated pre-launch attack and an extended area defense against the carrier. Rather than complicate, it might simplify Soviet defensive problems.

(*b*) *Development risk.*—While no unusual development problems are foreseen with respect to cruise missiles, this subject has not been examined in detail with respect to modification of a large commercial jet to a CMC configuration. The major unknown is concerned with cruise missile launch mechanization with emphasis on launch reliability, rate and cost.

(*c*) *Carrier size.*—The CMC–747 would present a very large radar cross section, more difficult to screen than a B–52 or B–1.

H. Alternative production/deployment rates

Based on preceding data in this section, two illustrative alternative approaches to bomber force modernization were developed.

Alternative A. B–52's with cruise missiles; defer B–1 production

Bomber force planning can be based upon (a) heavy reliance on cruise missiles launched from B–52's; (b) development of improvements to penetrating B–52's (the B–52X) and stand-off B–52's (the wide-bodied CMC), and (c) retaining the option to deploy a highly effective penetrating bomber (the B–1). This approach relies on early acquisition of a mixed force. It involves:

Assuming that cruise missiles will successfully complete development and perform as predicted.

Entering production of cruise missiles for deployment in the early 1980s according to the current production plan [deleted].

Reliance on existing B–52's and FB–111A's to meet the penetration tasks against an improving Soviet air defense.

Continued safe and efficient operation of the aging B–52 force.

Continued B–1 development to maintain the option for future deployment.

Possible development of a wide-bodied CMC as a replacement for or as an augmentation of the stand-off B–52 force.

Possible development of a B–52X to provide the option to enhance the effectiveness of the penetrating part of the B–52 force.

Alternative B. B–52's with cruise missiles; continue B–1 production

If one believes that the Soviet air defense threat will not permit adequate penetration by B–52's in the mid-late 1980's, then:

B–1 production should be continued.

The assumptions about cruise missiles in Alternative A above apply and those programs should be continued.

The assumption about B–52s and FB–111A's in Alternative A above would no longer apply, and development of a B–52X would not be appropriate.

In general, per Alternative A, the U.S. would be able to adjust, within leadtimes of a few years for cruise missiles and several years for a B–52X, the balance between cruise missile and penetrating bomber capabilities as evolution of the Soviet threat dictates.

With the B–1 in production as well as cruise missiles per Alternative B, the leadtime to adjust the penetrating bomber element of the force would be less than that of Alternative A.

The pace of the cruise missile programs and the B–1 or the B–52X programs can be managed to respond to assessment of U.S. targeting requirements (e.g, PRM–10, SALT, and the evolving international environment in addition to U.S.. perceptions of the Soviet threat.

In the case of the B–1, a firm decision to increase the B–1 production capacity beyond a two per month rate is not required until the submission of the fiscal year 1980 budget, and ultimate B–1 force level decisions can be made throughout the production phase of the program. However, a decision can be made at this time regarding the B–1 production rate. The following production rate sub-alternatives are examined: One per month; two per month (current tooling); and four per month (current FYDP plan).

General Characteristics of the Alternatives

1. *Bomber force plans*

Given a decision on a planned production rate for B–1's (1, 2, or 4 per month) and cruise missile [deleted] the size of the B–1 and cruise missile force can be seen as a function of the year of interest.

The number of B–52's retained in the 1980's could be varied based upon the rate and level of B–1 deployment as well as future strategic bomber tasks (nuclear and conventional). Likewise, FB–111A's could be retained in the strategic role, transferred to a general purpose role, or retired. In this study it was assumed that the existing B–52 and FB–111A force would be retained as varying numbers of B–1's are deployed.

I. Bomber production/deployment

The B–1 is currently in production. Fiscal year 1977 contracts were let for 3 aircraft and long lead items for another 5 aircraft to be started in fiscal year 1978. The current program is structured for an efficient buildup from the 5 aircraft buy in fiscal year 1978 to a maximum production rate of 4 aircraft per month with the fiscal year 1981 buy.

Other production rates and quantities have been considered, including rates of 1, 2 and 3 aircraft per month and quantities from 100 to 240 aircraft. A firm decision to increase the B–1 production rate above 2 aircraft per month is not required until the submission of the fiscal year 1980 budget and ultimate B–1 force level decisions can be made on a yearly basis throughout the production phase of the program.

The alternative aircraft programs (Wide Bodied Cruise Missile Carriers (CMC–747), B–52 CMCs, B–52X) are less defined since no development work other than conceptual studies have been accomplished. With a development funding start in fiscal year 1978, CMC–747 procurement could start by fiscal year 1981, B–52 CMC's by fiscal year 1979, and B–52X's by fiscal year 1979. Production rates of 2 per month, 6 per month, and 5 per month respectively have been examined but other rates are also possible. It should be noted that schedules for modifications to the B–52 must consider the removal of aircraft from the force for an extended period of time.

Assuming that cruise missiles successfully complete development and perform as predicted, production for deployment could be started in the early 1980's.

J. Bomber force costs

1. *B–1*

The impact on procurement costs of decisions to procure B–1's at varying rates and quantities is shown in Chart 12 for constant and inflated dollars. In both kinds of dollars, for total procurement quantities varying from 100 to 240 aircraft, the four aircraft per month maximum production rate is the least costly. If a two aircraft per month rate is selected, the procurement cost increases from $700 million to $1.7 billion in constant 1978 dollars and from $900 million to $3.3 billion in inflated dollars. Unit cost procurement increases $7 to

$7.6 million in constant dollars and $9.5 to $13.5 million in inflated dollars at the two aircraft per month rate. If a one aircraft per month rate were selected, the procurement cost increase would range between $2.7 and $8.7 billion in constant dollars and $3.8 and $17.8 billion in inflated dollars for buys of 100 and 240 aircraft.

B–1 PROCUREMENT COSTS

Procurement quantity	Maximum production rate (per month)					
	1		2		4	
	Total (billions)	Unit (millions)	Total (billions)	Unit (millions)	Total (billions)	Unit (millions
	CONSTANT 1978 DOLLARS					
100	$14.0	$140.4	$12.0	$120.4	$11.3	$112.8
150	18.7	124.9	15.2	101.4	14.2	94.4
200	23.4	117.2	18.0	90.1	16.6	82.9
240:						
Continue now	26.9	112.0	19.9	83.1	18.2	75.9
Restart October 1978			20.6	86.1	18.8	78.3
	THEN-YEAR DOLLARS					
100	$16.0	$160	$13.1	$131.1	$12.2	$121.6
150	24.0	160	17.1	114.2	15.5	103.3
200	32.0	160	21.0	104.8	18.5	92.4
240:						
Continue now	38.4	160	23.9	99.4	20.6	85.9
Restart October 1978			26.5	110.5	22.8	95.0

If the current B–1 production program is deferred until Oct. 1978 and then started again, and the production rate is set at a maximum of four aircraft per month for a 240 aircraft buy, the procurement cost would increase $600 million in constant dollars and $2.2 billion in inflated dollars. At a two aircraft per month rate, the increase would be $2.4 billion in constant dollars and $5.9 billion in inflated dollars. A deferral would also cause an immediate job loss for about 15,000 people and 56,000 man-years of new jobs would not be created in the fiscal year 1977 and 1978 period.

2. Alternative aircraft

The estimated cost to develop and procure 100 UE (114 total buy) 747 type cruise missile carriers is about $10.6 billion in inflated dollars or about $8.6 billion in constant fiscal year 1978 budget dollars. The cost of cruise missiles would add about $5.9 billion in inflated dollars or about $5.1 billion in constant fiscal year 1978 budget dollars to this total. A 50 UE (59 total) aircraft buy is estimated to be $5.8 billion in inflated dollars and $4.9 billion in constant fiscal year 1978 budget dollars. Cruise missiles for this buy are estimated at $3.4 billion in inflated dollars and $3.1 billion in constant dollars.

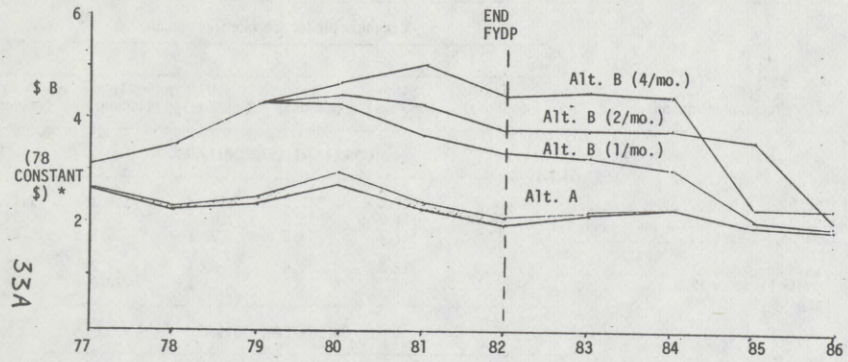
(U) The cost of the B–52 CMC is about $440 million in inflated dollars or about $400 million in constant 1978 dollars for a 241 UE buy. The B–52X cost for the same number is about $5.8 billion in inflated dollars or about $5.1 billion in constant dollars. Neither of these costs include weapons.

3. Comparisons

Chart 13 shows the illustrative funding profiles for three B–1 programs (4, 2 and 1 aircraft per month) and a program that defers B–1 production and develops improvements to penetrating B–52 bombers and standoff cruise missile carriers.

FUNDING PROFILE FOR BOMBER

MODERNIZATION ALTERNATIVES (U)



* Includes RDT&E and investment costs for bombers, bomber modifications, and bomber weapons plus direct operating costs for bombers, weapons, and tankers. (Hashed area represents CMC-747 and B-52X RDT&E.)

SECTION V. SALT CONSIDERATIONS

Potential SALT TWO provisions could impact on U.S. options and decisions regarding modernization of the strategic bomber force.

Bomber modernization options which include cruise missiles could be adversely affected by cruise missile range constraints, such as:

(*a*) Banning cruise missiles of range greater than [deleted].

With permitted cruise missile ranges of 2,500–3,000 KM, the U.S. could implemen standoff bomber employment (see Chart 14). At lesser ranges, [deleted].

Cruise missile counting rules [deleted] could [deleted] impact on U.S. bomber force modernization options [deleted].

One rule, which would count heavy bombers with cruise missiles with ranges between [deleted] in the 1320 MIRV aggregate, could necessarily limit the size of a cruise missile force and could affect U.S. MIRVed missile deployment plans, especially if reductions in the MIRV level are negotiated.

An agreement to ban cruise missiles with range greater than [deleted].

In general, depending upon (a) whether cruise missile carriers are counted, (b) what maximum cruise missile range is agreed, and (c) whether reductions in the MIRV aggregate level might be negotiated, the desirability of deploying bombers such as B–52s armed with long-range cruise missiles may be brought into question. However, the B–1 could provide an effective option to deliver shorter range cruise missiles through Soviet area defenses to launch points within the reduced cruise missile range.

PERCENT TARGET VALUE VS. ASM RANGE

(STANDOFF LAUNCH)

[Chart deleted.]

[Deleted.] If proposed and agreed, such a ban would create strong incentives for bomber force modernization [deleted].

APPENDIX A

COST-EFFECTIVENESS EXCURSIONS AND EVALUATION

Based upon the weapon loading and cost factors in Charts A–1 and A–2 and the attrition data discussed in Section III, cost-effectiveness comparisons among the alternatives can be made for a given level of effectiveness. However, it

should be noted that although cost-effectiveness comparisons of the bomber force alternatives provide valuable insights into the selection of preferred alternatives, such comparisons do not provide unequivocal answers.

A. Cost-effectiveness methodology

The cost of bomber modernization alternatives to attack effectively a common portion of the National Target Data Base are compared in this study. The common target system includes [deleted] in the Soviet Union and military targets in the Warsaw Pact and PRC. [Deleted.] Weapon-on-target requirements from a day-to-day alert posture to achieve comparable levels of damage for all alternatives vary [deleted] weapons which could be delivered on target with today's bomber force.

Three assumptions which have a significant impact upon the cost-effectiveness comparisons are (a) the force alert scenario used (day-to-day vs. generated), (b) in the absence of definitive reactive threat projections into the 1990's and beyond, the use of the mid-to-late 1980's threats, and (c) to a lesser extent, the costing period used.

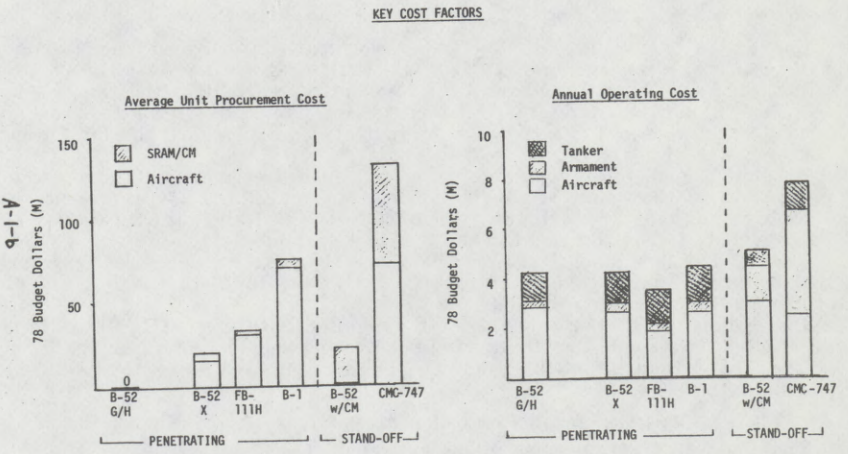
1. *Alert rate considerations*

For a generated alert case, action based on strategic warning is required. It takes [deleted] to get the current B–52/FB–111/KC–135 forces up to [deleted] condition from the present rate [deleted] and another [deleted] to get the aircraft to a [deleted] alert condition.

The current bomber/tanker force can sustain [deleted] alert for [deleted]. At the end of [deleted] it would be highly desirable to reduce to [deleted] alert for [deleted] in order to exercise aircraft inflight to insure systems reliability. Then the alert rate could again be increased to [deleted] an additional [deleted] before returning to a day-to-day 30 percent rate.[1]

KEY EFFECTIVENESS FACTORS

[Chart deleted.]



A-1-b

For a day-to-day alert case, only tactical warning is assumed [deleted], and the alert rates as shown in Chart A–1 are used. In sum: (a) penetrating B–52s could stand at about a 40 percent alert rate based upon previous experience; (b) B–52s with [deleted] cruise missiles could stand at [deleted] primarily because the aircraft/pilots would not need to fly low level training missions; and (c) B–1s/FB–111Hs/CMCs are assumed to stand alert primarily due to newer and more easily maintainable aircraft and subsystems and, in the case of the B–1, an automatic checkout and fault isolation system designed into the aircraft.

[1] The B–52 force currently stands at 29–30 percent alert because of a decision several years ago to reduce bomber operating costs. The force had been standing at a 40 percent alert rate.

2. *Costing period*

Investment costs (RDT&E and procurement) plus 10 or 20 years of operating costs are used in this study. An argument can be made that 10-year costs are appropriate in order to be roughly consistent with the time period of currently available DIPP threat projections.

On the other hand, 20-year costs may more closely approximate the life cycles of the alternatives.

The following discussion first consists of an evaluation of the cost-effectiveness of the alternatives assuming a day-to-day alert scenario. Following this, the impact of assuming a generated alert scenario is evaluated. Finally, considerations other than cost-effectivenness are discussed.

B. Cost effectiveness comparison: Day-to-Day Alert Scenario

An equal effectiveness comparison of the penetrating bomber alternatives is presented in Chart A–3 in terms of total system cost versus assumptions as to what weapon attrition.

From Chart A–3 it can be seen that [deleted.]

Because of the differences in attrition among the alternatives discussed in Section III above, a methodology has been developed to relate the costs of the alternatives to their relative attrition rates on an equal effectiveness basis (discussed below).

Since the B–1 is the most cost-effective penetrating bomber in a day-to-day alert scenario, it is compared with the B–52/CM and the CMC in the following charts. The discussion and charts cover, in turn, the impact of the following threats upon the cost-effectiveness of the alternatives: SLBM and fighter threats; SLBM's/fighters plus extended area defenses; SLBM's/fighters plus barrier/area LASAM's; and SLBM's/fighters plus terminal LASAM's.

20-Year Cost for Equal Effectiveness

[Chart deleted.]

1. *SLBM and fighter threats*

Chart A–4 shows a cost-effectiveness comparison between the B–1 and B–2 with cruise missiles and the B–1 and CMC over a range of total attrition values. The curves on the chart are cost-effectiveness indifference curves—i.e., anywhere along the curves the B–1 and the cruise missile alternatives cost the same to achieve equal effectiveness. As indicated on the chart, the indifference curves represent use of 10- and 20-year costs.

Assuming bomber ECM is effective, no extended area defense intercepts, and no LASAM's, the small rectangle labeled (1) on Chart A–4 represents the DIA high mid-late 1980's threat case for both the B–1 and the cruise missile—i.e., [deleted] (see pp 9, 10, and 18 and Charts A–3 and A–3–1).

The solid square labeled (2) on Chart A–4 represents a depressed trajectory SLBM threat/Mod-Hi fighter threat [deleted] case for both the B–1 and the cruise missile alternatives [deleted].

In reading Chart A–4, one sees, for example, that [deleted] (Mixed forces of stand-off cruise missile carriers and penetrating bombers are discussed later.)

The DIA estimates that the rectangle (1) represents the Soviet threat through the mid-late 1980's.

2. *SLBM's/fighters plus extended area defenses*

The impact of assumptions about extended area defenses on the choice of alternatives is shown in Chart A–5.

An extended area defense with [deleted].

Preference Regions for Pure Penetrating B–1 Forces and Standoff Cruise Missile Forces

(10- and 20-Year Cost for Equal Effectiveness)

[Chart deleted.]

(Cost for Equal Effectiveness)

[Chart deleted.]

In the case of the CMC, the effectiveness of an ECM package for a wide-bodied carrier has not been evaluated due to the lack of technical and cost data.

A CMC ECM system [deleted].

3. *SLBM's/fighters plus barrier/area LASAM's at unknown locations*

The impact of assumptions about barrier/area LASAM's on the choice of alternatives is shown in Charts A–6 through A–9. [Deleted.]

In reading the charts, one can see how assumptions about the engagement P_k of the LASAM sites drive one to prefer [deleted].

4. *SLBM's/fighters plus terminal LASAM's*

The impact of assumptions about terminal LASAM's on the choice of alternatives is shown in Chart A–10. [Deleted.]

As in the case of area LASAM's, it can be seen in Chart A–10 how assumptions about LASAM P_{ks} drive one's preference for either cruise missiles or B–1's.

Chart A–11 was developed assuming [deleted].

PREFERENCE REGIONS FOR PURE PENETRATING B–1 FORCES AND STANDOFF CRUISE MISSILE FORCES (COST FOR EQUAL EFFECTIVENESS)

DAY-TO-DAY ALERT—10-YEAR COST, ECM EFFECTIVE

[Charts deleted.]

5. *Terminal LASAM's and mixed forces*

Consideration of terminal LASAM's introduces the question of whether a mixed rather than a pure force would be preferred—i.e., would one prefer a force of penetrating bombers with SRAM's to attack targets defended by terminal LASAM's and a force of stand-off cruise missiles to attack targets not defended by terminal LASAM's.

A mixed force is preferred over a prime cruise missile force [deleted].

A pure B–1 force is preferred over a pure cruise missile force [deleted].

A pure B–1 force or a pure cruise missile force is preferred over a mixed force of B–1's/cruise missiles [deleted].

6. *ECM effectiveness*

As discussed in Section III (pages 19 to 21), assumptions about the effectiveness of ECM are critical to the attrition factors to be applied to a bomber force. That is, with ECM which is ineffective force-wide.

B–1, FB–111H, and B–52 weapon attrition to fighters could be [deleted].

Total bomber weapon attrition (including fighter attrition) to barrier or area LASAM's could be [deleted].

Attrition of cruise missiles launched from B–52/CM through an extended area defense could [deleted].

The B–1's ECM design is an improvement over that of the B–52. In addition, the B–1's [deleted] RCS can be screened with less effort than the [deleted] of the B–52. Moreover, the attrition figures for moderate-high fighter threats used in this study, which are based on the JSBS evaluation, [deleted] of the B–1 ECM design capability.

A more complete discussion of ECM effectiveness appears in Appendix B. [Deleted.]

C. Cost-effectiveness comparison: Generated alert scenario

Using a generated alert scenario increases the cost-effectiveness of the B–52/CM relative to the CMC and the B–1. The reason is that on generated alert all systems are at [deleted] alert whereas on day-to-day alert the B–52/CM is on [deleted] alert as compared to [deleted] for the CMC and B–1.

(U) The impact on B–52/CM cost effectiveness vis-a-vis the B–1 is shown in Charts A–12 and A–13.

With regard to the penetrating bomber comparisons, the B–52 options become more competitive with the B–1 on generated alert because the B–1's day-to-day advantage of [deleted] alert vice [deleted] for the B–52's is lost. (No change occurs for the FB–111H because its day-to-day alert rate is the same as the B–1.)

The impact of the generated alert scenario on B–52's vs B–1's is shown in Chart A–14. It can be seen that the B–52G/H is preferred over the B–1 as a penetrator when the fighter threat is [deleted] (label (1) on the chart). Given the DIA estimate that this represents the Soviet threat through [deleted] the B–52G/H would be a cost-effective penetrator through that time period and B–1 production start-up could be delayed.

On the other hand, if Soviet fighter capability is of [deleted] as the Air Force projects, then the B–1 would be the most cost-effective penetrator.

When considering the B–52X in a generated alert scenario, however, it is competitive with the B–1 even against [deleted] fighter quality (see Chart A–14), and approaches the B–1 in cost effectiveness on day-to-day alert in the face of [deleted] fighter threats.

[Deleted.]

PREFERENCE REGIONS FOR PURE PENETRATING B–1 FORCES AND STANDOFF CRUISE MISSILE FORCES (COST FOR EQUAL EFFECTIVENESS)

[Charts deleted.]

APPENDIX B

ASSESSMENT OF ECM

There are differing views among the participants as to the effectiveness of ECM. Following below are the views of the Air Force and those of DIA.

A. Air Force view on ECM assessment

Although important for strategic planning, intelligence estimates are not the sole determinant of ECM success or failure for our strategic forces. Nor is today's ECM the panacea for bomber penetration. Nevertheless, ECM is a primary player in the prosecution of the strategic mission.

Strategic force planning has traditionally employed the basic concepts of avoid, degrade, and destroy. Intelligence provides the critical information on defensive deployments and locations which permit the strategic force planner to minimize penetrator exposure through judicious route planning. When intelligence identifies new defensive deployments which impact routes already planned, routing is adjusted, if possible, to avoid these threat areas. In those instances, where defenses cannot be avoided and an acceptable level of expected degradation cannot be achieved, weapons (i.e. SRAM) may be planned to suppress or destroy such defenses. Additionally, some defenses will receive collateral damage from weapons arriving on objective targets. The strategic force planner may take advantage of this damage to defenses in the route planning process.

The goal of ECM is to deny the opportunity to attack; the expectation is that ECM will produce delays and confusion which degrade the enemy's chance of success. For those threat systems which cannot be avoided, ECM and tactics serve to limit the engagements enforceable by the defense. While it may not be possible for ECM to deny all engagement opportunities to the modern defensive systems, we strive for significant degradations to their capabilities. By employing tactics and equipment in concert, we can provide the penetrator with mission flexibility; flexibility to adapt to observed changes in the defensive environment or to the encounter of an unexpected threat.

In recognition of our technology and future force plans, the Soviets are pursuing new technologies of their own. Defensive weapons are becoming more sophisticated with lower altitude capabilities and ECCM techniques which require changes to old-time comprehensions of what ECM should be. In today's age of electronics advances, ECM effectiveness is no longer a simple ratio of power to power. New techniques and novel approaches to countermeasures are required. The ECM of today is a complex game of electronics and tactics aided by computers and the human decision element.

Intelligence can provide reasonable estimates of the defensive environment in the near term, but these become more shaded as we project ten years or more into the future. They progress from knowledge gained by exploitation of captured equipment, through near term educated extrapolations, to estimates about what others plan but have not yet done. Since this progression leads to higher levels of uncertainty, we view our intelligence estimates with caution and use them as planning factors. This situation presented nearly insurmountable obstacles in the path of ECM development in bygone days. In the past, we had difficulty keeping pace with threat developments. We were hampered not only by estimation uncertainties, but by equipment limitations as well. Specifically, we had no airborne computer aided ability to adjust to changes in the defense environment. We were forced to *react* to confirmed intelligence estimates of threat characteristics because of the long lead times and hardware costs required to act upon what potential opponents were thought to be doing or predicted to be able to do. Today, airborne computer technology provides the edge which allows ECM to overcome this problem.

Modern ECM systems are designed with computer selected responses against a wide range of defensive radar types whose characteristics can be analyzed

and assessed as the airborne mission progresses. We no longer have to rely solely on brute force power applied blindly across the spectrum of the threat. Modular components encompassing the frequencies of interest are programmed to reply only when needed, in the direction of the threat, and with the ECM techniques appropriate to the type of threat. Although the characteristics of a given threat may never be completely known, there are certain basic ECM techniques which work well against generic types of radars. Since these responses are computer driven, they can be readily updated when new facts about the threat become known. A continuing level of assessment and testing assures current, up-to-date ECM programs which are able to degrade automatic threat response and limit the defense opportunity to engage through confusion and delays or, failing this, reduce engagement success. Throughout this continual evaluation process, our technology is examined to provide insight into possible threat ECCM approaches, and thus identify improved software and tactics for our countermeasures efforts. The evaluation process makes the results of automatic interactions between threat and ECM predictable; the basic effectiveness uncertainties now lie more in the area of human responses and capabilities for data handling in the face of countermeasures (electronic and tactics).

While there is a band of uncertainty to the attainment of the ECM goal, the area of uncertainty is not so sharply defined as to draw clear lines at the edges of the band, nor is it so broad that one can discount ECM as a contributor to penetration. A cursory examination might indicate a wide range of possibilities for reducing ECM effectiveness, including introduction of new defensive systems on systems at previously unknown locations. But, though there may be some initial difficulties in confirming new threats, it is difficult to conceal any significant activity in building and fielding large numbers of defensive systems. In cases where new equipment or defense locations are encountered, the human decision element on the part of the aircrew becomes a valuable asset to penetration success—their response to the unexpected threat may include some combination of tactics (including avoidance) and ECM equipment setting adjustments. So, introduction of markedly different threats or relocation of defenses can yield only a small effect on the penetrating force before plans, tactics, and ECM programs compensate for them.

While countermeasures effectiveness is not an easily defined black or white situation, there is a great deal of confidence in success for the mass encounter scenario. ECM, tactics, and employment practices offer flexibility over such wide ranges of threat possibilities that they provide a high degree of expected success to bomber penetration—a success and flexibility which will enable the bomber to be a usable weapons system over the long-term and in a wide range of applications.

B. DIA view on ECM assessment

[Under separate cover.]

APPENDIX C

ALTERNATIVE B–1 PRODUCTION AND FUNDING PLANS

A. Introduction

The B–1 program was reviewed by the Defense Systems Acquisition Review Council (DSARC) to determine whether or not the program should proceed into production. Three procurement cost estimates were reviewed by the DSARC as follows:

	Billions
Total Procurement:	
Program manager	$18.7
Cost-analysis improvement group (CAIG)	25.0
Air Force independent cost analysis (ICA)[1]	22.1

[1] The Air Force ICA also estimated a total procurement cost of $19.2B based on historical data. The $22.1B above is based on specific F–15, A–10 and F–16 cost actuals and esimates.

The DSARC considered these differences and reported in December 1976: "Notwithstanding the fact that the CAIG and ICA analyses indicate that the Program Manager's cost estimate may be optimistic, the finding of the DSARC is that even at the higher potential cost projections, the B–1 remains the most cost effective alternative for modernizing the strategic bomber force and recommends that production should now be initiated." Subsequently, the Secretary of Defense informed the Secretary of the Air Force that "the Air Force procurement cost estimate, reviewed by the DSARC, [was] the approved procurement funding plan for the B–1."

The Amended Budget Request adjusted the program buy schedule and program cost as shown below.

[In millions of dollars; fiscal years]

	1977 and prior	1978	1979	1980	1981	1982	Complete	Total
Original fiscal year 1978 budget:								
R.D.T. & E	3,235	442	310	132	48	31	10	4,209
Procurement	1,160	1,711	2,605	2,892	3,011	2,835	4,487	18,639
Quantity	(3)	(8)	(19)	(32)	(45)	(48)	(85)	(240)
Amended fiscal year 1978 budget:								
R.D.T. & E	3,235	442	310	132	48	31	10	4,209
Procurement	1,160	1,431	2,328	2,308	3,099	2,962	5,850	19,139
Quantity	(3)	(5)	(13)	(27)	(45)	(49)	(98)	(240)

The OSD estimate of the cost impact of the schedule adjustment is an increase of $500 million or 3 percent, and this $500 million increase is reflected in the amended funding plan.

The Air Force has reestimated the program based on the schedule adjustment. The revised Air Force estimate for total procurement is $20,617 million or $1,977 million over the original fiscal year 1978 Budget Request. The Air Force attributes $428 million of this cost growth to low initial estimates and the remainder to the schedule change.

Based on their revised estimate of $20,617 million, the Air Force has estimated program alternatives which are shown below.

B. Alternative production programs—cost comparison

[In millions of dollars; fiscal years]

	1977 and prior	1978	1979	1980	1981	1982	To complete	Total
1. Revised planned program—Builds to production rate of 4 aircraft per month:								
R.D.T. & E	3,236	442	310	132	48	31	10	4,209
Procurement	1,160	1,431	2,434	2,895	3,334	3,357	6,005	20,617
Quantity	(3)	(5)	(13)	(27)	(42)	(48)	(102)	(240)
2. Lower rate production program:								
(a) Builds to production rate of 3 aircraft per month:								
R.D.T. & E	3,236	442	310	132	48	31	10	4,209
Procurement	1,160	1,470	2,484	2,955	3,074	2,795	8,156	22,094
Quantity	(3)	(5)	(13)	(27)	(36)	(36)	(120)	(240)
(b) Builds to production rate of 2 aircraft per month:								
R.D.T. & E	3,236	442	310	132	48	31	10	4,209
Procurement	1,160	1,483	2,439	2,199	2,365	2,154	12,062	23,862
Quantity	(3)	(5)	(13)	(18)	(24)	(24)	(153)	(240)
(c) Builds to production rate of 1 aircraft per month:								
R.D.T. & E	3,236	442	310	132	48	31	10	4,209
Procurement [1]	1,160	1,431	2,394	1,817	1,611	1,612	28,335	38,360
Quantity	(3)	(5)	(12)	(12)	(12)	(12)	(184)	(240)
3. Defer production 2 yr—Cancels production in fiscal year 1977; restarts in fiscal year 1979 and builds to 4 aircraft per month; complete development program as planned:								
R.D.T. & E	3,236	442	350	172	48	31	10	4,289
Procurement	726	99	1,162	1,554	2,556	3,122	13,584	22,803
Quantity			(3)	(8)	(19)	(32)	(178)	(240)
4. Defer production 2 yr—Cancels production in fiscal year 1977; restarts in fiscal year 1979 and builds to 2 aircraft per month; complete development program as planned:								
R.D.T. & E	3,236	442	350	172	48	31	10	4,289
Procurement	726	99	1,162	1,612	2,561	2,389	17,968	26,517
Quantity			(3)	(5)	(13)	(18)	(201)	(240)
5. Retain program in development and cancel production—Continues flight test program and limited ground test. Cancels support system development:								
R.D.T. & E	3,236	355	210	110	48	31	10	4,000
Procurement	533							533
6. Cancel program—Terminates all effort by June 1, 1977:								
Total:								
R.D.T. & E	2,962							
Procurement	533							

[1] OSD estimate.

The following table summarizes the program alternatives.

[Dollar amounts in millions]

	Total program [1]	Average unit procurement cost	Procurement quantity		Last fiscal year of funding	Last delivery
			Fiscal year 1978	Fiscal year 1979		
Original budget	$22,849	$77.7	8	19	1984	January 1986.
Approved current budget	23,348	79.7	5	13	1984	June 1986.
Current Air Force estimate	24,826	85.9	5	13	1984	Do.
Lower production rate:						
3 aircraft per month	26,303	92.1	5	13	1986	August 1987.
2 aircraft per month	28,071	99.4	5	13	1989	November 1990.
1 aircraft per month	42,569	159.8	5	12	1998	
Defer production 2 yrs:						
4 aircraft per month	27,092	95.0	0	3	1986	April 1988.
2 aircraft per month	30,806	110.5	0	3	1991	March 1992.
Continue R. & D./Cancel production	4,533					
Cancel Program	3,495					

[1] 240 production aircraft except cancellation options.

C. Alternative production programs—employment impact

The following table summarizes the impact of the various alternative programs on current and projected employment levels.

[In thousands; fiscal years]

Alternative	Layoffs	Projected employment					
		1977	1978	1979	1980	1981	1982
Lower rate production:							
1 per month			−0.8	−3.8	−10.5	−21.4	−19.9
2 per month			−.8	−3.8	−7.6	−18.9	−17.9
3 per month			−.8	−3.8	−3.5	9.0	8.5
Defer production 2 yr:							
4 aircraft per month	14.7	−18.9	−37.3	−16.9	−14.0	−11.0	−2.0
2 aircraft per month	14.7	−18.9	−37.3	−16.9	−14.0	−11.0	−9.6
Development only	15.8	−20.0	−38.7	−47.2	−54.0	−63.0	−58.4
Cancel program	35.2	−35.4	−46.2	−52.3	−59.0	−65.0	−59.4

Question 11. Dr. Perry, the Joint Strategic Bomber Study was completed in 1974 and concluded that a Strategic Bomber Force that contained B–1s was the most cost effective over a number of other force combinations. However, the Strategic Bomber Force Modernization Study apparently concludes that a strategic force more dependent on cruise missiles is the most cost effective.

What, in your opinion, is the primary reason that two major studies by the Department, conducted in a relatively short period of time of each other, could come to such different conclusions?

How do you account for this difference?

Explain why the force you are now proposing is, in fact, a more cost effective force.

Answer. The primary reasons for differences between the Joint Strategic Bomber Study (JSBS) and the Modernization of the Strategic Bomber Force Study are: differences in input threat assumptions, successful tests of the cruise missile, and different judgments about confidence in penetrating.

At the time the JSBS was performed, 1973–1974, a threat for the mid-to-late 1980's was needed for the study's purposes. The DIA and National Estimate threat projections, both then and now, are for up to 10 years in the future. Consequently, in 1973–1974, there was no official DIA threat for the late 1980's; and the JSBS used a modified informal intelligence estimate for the late 1980's. To quote the JSBS: "In some cases more severe—but technically feasible—threats have been defined in order to provide responsiveness in the threat."

For the Modernization of the Strategic Bomber Force Study official intelligence inputs (through 1986) and variations therefrom were used. Major differences in these two threat inputs concerned the number and effectiveness of low altitude SAM's, [deleted] fighter effectiveness, and greater emphasis in the latter study on [deleted] intelligence data [deleted] to permit a confident assessment of bomber ECM effectiveness.

Qualitative factors also played an important role in our decision. We have greater confidence in the ability of cruise missiles to penetrate Soviet air defenses than we have in the effectiveness of ECM to aid bomber penetration. This judgment plus the successful testing of the cruise missiles since the JSBS leads to the conclusion that the mixed force of cruise missiles and penetraters that we are now proposing will have a higher confidence of penetrating Soviet air defenses.

Question 12. In the Strategic Bomber Force Modernization Study, what general conclusions can be drawn from the data presented in Appendix C?

Answer. Appendix C to the bomber modernization study was included to provide a background of recent B–1 program cost data as well as show the funding profile for the existing program. In addition, the appendix provided a cost comparison of alternative B–1 production programs that were of interest. The "conclusions" would simply be the relative costs of producing the B–1 at other than the planned rate of 4 per month.

Question 13a. In December 1976, the DSARC reported that the B–1 remains the most cost effective alternative for modernizing the strategic bomber force and recommended that production be initiated. Dr. Perry, has a subsequent DSARC been convened to consider the new data brought out by the Strategic Bomber Force Modernization Study on the B–1 program?

Answer. A subsequent DSARC for the purpose you state has not been convened. The recommendations which the Secretary of Defense made to the President were based, in part, on advice and assistance from DSARC principals.

Question 13b. Have these proposed new program starts requested in this Supplemental been subject to DSARC process?

Answer. A formal DSARC on these items has not been held. The only new item, per se, in the supplemental is the Cruise Missile Carrier. Again, DSARC principals offered advice and assistance on the content of the Supplemental.

Question 14. Was the decision to cancel the B–1 a decision against a future manned penetrating bomber or was it a decision only against the B–1 for that role?

Answer. The decision to cancel the B–1 was not a decision against a future manned penetrating bomber.

Question 15. One of the charts in your study indicates that average unit procurement cost of a B–1 and a CMC–747 is about the same. On what size force and what monthly production rates was the average unit procurement cost based for a CMC–747?

Answer. Since the analysis was based on equally effective forces, the size of the CMC–747 force varied depending on the severity of the assumed threat to the cruise missiles. Production rates for the CMC–747 similarly varied from as low as one per month to as high as about four aircraft per month. In like fashion, the size of the B–1 force varied with the varied threat assumptions.

The chart in the study gives an indication of procurement costs for the various alternatives for one force size.

Question 16. Was the annual operating cost of a B–52 with cruise missiles determined to be more or less than a B–1?

How do the life cycle costs compare?

Answer. The annual operating cost of a B–52 with cruise missiles is slightly more than that of the B–1. For equal force effectiveness, life cycle costs vary according to the assumptions about weapon attrition to the threat. But, at comparable threat levels, the pure force of B–52s with cruise missiles was about $6 billion less than an equally effective pure B–1 force (in FY 78 dollars) over a 20-year cost period.

	B–1	B–52 w/CM's
Annual O. & S. costs (fiscal year 1978 budget) includes aircraft, weapons plus tanker (millions)	$4.5	$5.2
Number of UE aircraft for equal eff	101	112
Acquisition cost (fiscal year 1979 budget) includes aircraft and weapons (billions)	$12.3	$3.9
20-yr O. & S	9.0	1.7
20-yr system cost (fiscal year 1978 budget)	21.3	15.6

Question 17. Was the annual operating cost of a CMC–747 determined to be more or less than the B–1?

How do the life cycle costs compare?

Answer. The annual operating cost of a CMC–747 was slightly less than that of the B–1. For equal force effectiveness, life cycle costs vary according to the assumptions about weapon attrition to the threat. But, at comparable threat levels, the pure force of CMC–747s was about $7 billion less than an equally effective pure B–1 force (in FY 78 dollars) over a 20-year cost period.

Question 18. Did the Joint Strategic Bomber Study consider the same cost effectiveness factors that were considered in the Bomber Modernization Study? Explain any differences.

Answer. The key effectiveness factors in the Bomber Modernization study were the same as those in the Joint Strategic Bomber Study (JSBS) with the two exceptions. Analysis after the JSBS showed that (1) a B–52 with cruise missiles could perform a higher day-to-day alert rate if the B–52 was not required to penetrate at low altitude and (2) an all stand-off force of B–52's with cruise missiles required an average of [deleted] rather than none as in the JSBS. Key effectiveness factors are shown below.

See Question 11 for additional information. Question 24 also contains information relative to cost effectiveness factors.

Question 19. Dr. Perry, the study, in referring to Chart A–4, states that the chart shows that a pure CMC force would be more cost effective than a pure B–1 force in the face of a number of threats. Would you explain to the Committee how that chart was constructed and why that conclusion can be drawn?

Answer. Chart A–4 was constructed using the data from Chart A–3–1. The indifference curve on Chart A–4 can be drawn by plotting the weapon attrition values for the B–1 and CMC forces that coincide with equal cost points for the two forces.

The plotted indifference curve separates the values of weapon attrition where one would prefer the B–1 over the CMC force. Thus, for the stated threat (labeled block (1)) the weapon attrition values are such that they fall entirely in the region where a pure CMC force is preferred over a B–1 force.

Question 20–21. The Joint Strategic Bomber Study concluded that by the late 1980s the Soviet threat to the bomber force would result in rather severe attrition to the B–52 force and would result in substantial attrition to B–1s and cruise missiles as well. However, DIA's analyses in the Strategic Bomber Force Modernization Study indicates that the threat is not that severe, which differs significantly with the Joint Strategic Bomber Study on the predicted vulnerability of cruise missiles to SAMs.

Mr. Hughes, how many conclusions in the Joint Strategic Bomber Study does the DIA disagree with? Are your disagreements based on Soviet data received subsequent to the Joint Strategic Bomber Study or are we speaking only of a change in the assessment, not in the threat?

Answer. [Deleted.] Consequently, DIA does not agree with the baseline JSBS results which [deleted].

At the time the JSBS was performed, 1973–1974, a threat for the mid-to-late 1980's was needed for the study's purposes. The DIA threat projections are normally [deleted] for up to 10 years in the future. Consequently, [deleted] in 1973–1974, there was no official DIA threat for the late 1980's, and the JSBS used a modified informal intelligence estimate for the late 1980's. To quote the JSBS: "In some cases more severe—but technically feasible—threats have been defined in order to provide responsiveness in the threat."

Question 22. Dr. Perry, the Joint Strategic Bomber Study concluded that the ALCM does fairly well against fighters, but that its performance was critically dependent on what assumptions are made about the Soviet low altitude SAM capability. The study pointed out that in this particular analyses it was [deleted]. It did concur that the ALCM could augment the effectiveness of the manned bomber.

What has changed since the Joint Strategic Bomber Study was published to make that statement no longer valid?

Why is that conclusion no longer valid?

Answer. In answering Question 11 it was pointed out that the Modernization Study considered differences in input threat assumptions, successful tests of the cruise missile, and different judgments about confidence in penetrating. Specifically,

—the major differences in threat assumptions dealt with the number and effectiveness of low altitude SAM's, look-down-shoot-down fighter effectiveness, and the [deleted].

—the qualitative factors relating to confidence in cruise missile performance as a result of successful flight tests, and confidence in the ability of cruise missiles to penetrate air defenses compared to confidence in the effectiveness of ECM to aid bomber penetration.

The JSBS conclusion that cruise missiles augment the effectiveness of the manned bomber is not denied by the Modernization Study. And, in fact, the decision to procure cruise missiles also emphasizes the converse—that manned bombers aid cruise missile effectiveness. The mixed force is still considered the most prudent approach since it requires the enemy to consider both types of weapons in his defense planning. Additionally, the bombers can stand away from defended targets and attack with SRAM, thereby further reducing any risk by having the cruise missile do this job. The bombers also can attack those targets which, under certain circumstances, might be beyond cruise missile range capabilities.

Question 23. Dr. Perry, the Joint Strategic Bomber Study concluded that a stand-off force of ALCMs of the characteristics used in the study were [deleted] competitive with the penetrating bomber although it was implied they could be cost effective in a complementary role going against undefended target complexes? Why is that conclusion no longer valid?

Answer. As stated in Question 11, there is a great deal of confidence in the cruise missile's ability to penetrate defenses. The observation that cruise missiles are cost effective in a complementary role against undefended target complexes is still valid. In our plans for a mixed force of penetrating bombers and aircraft carrying cruise missiles we intend to allocate weapons to obtain maximum target destruction. SRAM missiles will be used primarily against highly defended targets and cruise missiles will be employed based on the latest assessments of enemy defensive capability and cruise missile survivability to maximize their contribution to the total bomber weapons mix.

Question 24. Dr. Perry, the Joint Strategic Bomber Study concluded that the CMC–747/B–52H stand-off missile force was found to be a less cost effective force.

Why is that conclusion no longer valid?

Answer. This question has been answered by the response to Questions 11 and 18.

In the Joint Strategic Bomber Study, forces had to face more than [deleted] which had a probability of kill (P_k) of about [deleted]. In the current study, the threat is [deleted] with a P_k substantially less than [deleted]. Additionally, B–1 costs increased in the period between the Joint Strategic Bomber Study and the Modernization Study.

Question 25. Dr. Perry, last March during our strategic bomber force weapons hearing, Senator Bartlett asked General Slay the following question. "Let's suppose that we modernize the B–52 or a nonpenetrating plane with as rich and versatile a mix of these advanced bomber weapons as possible. What kind of targets currently in the SIOP would we not be able to attack confidently by the mid-1980s?" General Slay's response was, "You could not attack [deleted] targets, Sir." Dr. Perry, do you agree with that response?

Answer. I have a somewhat different judgment as regards the ability of cruise missiles to attack [deleted] targets. [Deleted.]

Question 26. Dr. Perry, during our hearings last March, I asked the following question, "Looking at your projection of the Soviet defenses, what is it that would preclude an all cruise missile force from being as effective as bombers with laydown weapons?" What is your response to that question?

[Deleted] the effectiveness of the cruise missile compared to that of the penetrating bomber with laydown weapons. In the future, the Soviets may attempt to tailor their defenses and offenses to [deleted] of cruise missiles from the carrier aircraft. They could also [deleted].

Question 27. Dr. Perry, what flexibility is there in the stand-off cruise missile force concept in case the projected threat should change?

Answer. The elements of flexibility available to us should the projected threat change are:

1. Cruise missile improvements (higher speed and lower observables).
2. Retention of some penetrating Bombers.
3. Use of ICBM's and SLBM's for defense suppression.
4. Addition of ECM to cruise missiles.
5. Cruise missile carrier or bomber self defense.

Question 28. Dr. Perry, prior to this Supplemental Request, the Department of Defense had requested to proceed with a number of bomber weapon programs to include SRAM–B, ALCM–A and B, ASALM and the FUFO bomb. ALCM–A and SRAM–B were cancelled, as I understand it, since a penetrating bomber was no longer required. If that is the case, why are ASALM and FUFO still required? Were not these two weapons also required to support the penetrating bomber?

Answer. The FUFO is still required for use on penetrating bombers. ASALM is a future generation cruise missile which could be used for interceptor destruction, defense suppression or the attack of objective targets. We are still in the process of examination of the most desired role of ASALM.

Question 29. Dr. Perry, on the one hand the Department of Defense plans to continue the B–52 as a penetrator as long as possible, but on the other hand, ALCM–A was canceled since its range was too short to be used in the standoff mode. Why isn't ALCM–A required if the B–52 will continue to be used as a penetrator?

Answer. A short range cruise missile may still be a desirable feature of the penetrating bomber force in the mid–1980's and beyond. However, because of the high national priority of the long range cruise missile, we believe that it is better management to initially focus on development of this long range missile in a competitive fly-off. If it is determined that a short range missile is also needed, that capability can be achieved as an outgrowth of the long range cruise missile program.

Question 30. Dr. Perry, is there still a requirement to accelerate development of the ASALM? Why? What is the major target ASALM is planned to defeat?

Answer. Accelerating the ASALM development is now desirable to maintain the effectiveness of the strategic bomber and cruise missile carrier forces. Based on the B–1 decision, it is anticipated that the manned strategic forces in the 1980s and 1990s will consist of the B–52, FB–111 and possibly cruise missile carriers. [Deleted].

Question 31. Dr. Perry, based on the decision to cancel the B–1 production and move toward a greater reliance on cruise missiles, what is your estimate of the U.S. manned strategic force for the 1985 through 1990 time period? Provide an answer in terms of an estimated percentage of the force that will be a deep penetrator, medium penetrator, shallow penetrator, minimum stand-off and maximum stand-off. Describe the carriers that will have the stand-off role.

Answer. Based on the Presidential decision to move towards a greater reliance on cruise missiles, we estimate that the majority of the future manned strategic bomber force will probably stand-off. Stand-off distances and penetration depths will vary and will depend on what the specific target destruction goals are at the time.

We plan to use some of the B–52 fleet as stand-off carriers. These may be augmented or replaced by wide body carriers as dictated by our continuing research and development efforts and by the experience gained in our initial cruise missile deployments. Some B–52's and the FB–111's will penetrate.

Cruise missiles launched at a nominal stand-off distance of about [deleted] of the target base. All of the targets could be covered if cruise missiles are launched inside the EW/GCI line.

Question 32. Dr. Perry, during the process that led to the cancellation of the B–1 production, what study was done by you and the Secretary of Defense on the impact such a decision would have on the SIOP?

Answer. There was no specific study accomplished which specifically addressed the impact of B–1 production cancellation on the SIOP. However, the analysis which was provided to Secretary Brown examined the relative ability of alternative bomber modernization options to maintain bomber force effectiveness against the projected Soviet threat.

Question 33. Dr. Perry, can you testify unequivocally that the now planned for strategic force will mean no degradation in our ability to carry out the SIOP when this force is in the inventory? Can we expect the targets in the SIOP to be destroyed with the same level of damage expectancy?

Answer. Yes, the programmed modernized bomber force will result in greater numbers of more effective warheads. We can expect targets to be destroyed at comparable levels of damage as these more accurate systems are deployed.

Question 34. Dr. Perry, what size cruise missiles force is projected now that the B–1 will no longer be in the inventory? How does that compare with the number of CM's planned for with the B–1 in the inventory?

Answer. We tentatively plan to deploy [deleted] range cruise missiles on the [deleted]. The Air Force had previously considered deploying [deleted] bombers with the B–1 in the inventory.

We are currently planning to deploy about [delete] range cruise missiles.

Question 35. Dr. Perry, the Bomber Force Modernization Study concluded that based on the mid-to-late 1980's HIGH DIPP threat estimate used in the study, the effectiveness of the present strategic bomber force could decrease significantly unless the force is modernized. Does that statement refer to a penetrating bomber force or a stand-off bomber force? What kind of "modernization" is the study referring to?

Answer. The statement refers to continuing with an all-penetrating bomber force composed of B–52's and FB–111's.

Modernization options involved modernizing the penetrating force with B–1's, FB–111H's, or modified B–52's; and/or modernizing the B–52 force with cruise missile, weapons, and/or modernizing the force with CMC's.

Question 36. Dr. Perry, the Bomber Force Modernization Study concludes that ECM countermeasures effectiveness is not predictable with high confidence. Do you agree with that conclusion?

Answer. Yes. ECM has been and probably always will be a valuable asset. However, it is subject to counter countermeasures such as direction finding on jam or even home-on-jam techniques. [Deleted.] In comparing ECM with a passive penetration scheme such as reduced radar cross section, I have more confidence in the effect of the latter.

Question 37. Dr. Perry, are you able to quantify what weight ECM was given in the B–1 decision?

Answer. ECM was given considerable weight. The Secretary noted in his statement that the B–1's ECM gear was assumed to be moderately effective and that "while we have no reason to believe that it would not have been, that is an inherently uncertain and, indeed, unknowable issue . . . until we complete the ECM operational testing in the fall of 1979. Even then, we will still be uncertain as to what Soviet systems it would have to defeat . . . But I have more confidence in our estimate of the effect that the low detectability of the cruise missile will have on Soviet radars than in the effect that the B–1's radar countermeasures would have had.

Question 38. Is DDR&E in disagreement with the Air Force on ECM effectiveness? If so, what are the specifics of the disagreement, and provide your suggestions as to how any differences can be resolved.

Answer. DDR&E is not in disagreement with the Air Force in principle. It is a matter of relative emphasis. I am sure that all concerned in the decision making process would feel more comfortable having had conclusive ECM tests against defensive systems with well known performance, as indicated in an earlier answer.

Question 39. What weight did you give to survivability of the B–52 force at its home base after attack by SLBM, [deleted.] What did your study show in that regard?

Answer. Bomber prelaunch survivability was assessed relative to the HIGH DIPP threat which supported [deleted] deployed SSBN's. The logical way to evaluate bomber survivability against that threat is not at its home base but in a more survivable basing mode. The bomber study showed that in a dispersed condition alert B–52's suffered [deleted] losses with [deleted] SLBM's and [deleted] losses with [deleted] SLBM's.

Question 40. Dr. Perry, the Secretary of Defense indicated that the B–1 decision was in part based on its high cost and that if it had been about 30 percent cheaper, it might have been retained. Yet, your study concludes that, "For the projected mid-to-late 1980s threat cost effectiveness analysis does not provide unequivocal answers regarding the choice among bomber force modernization alternatives—pure penetrating bombers, pure cruise missile carriers, or tested forces," and that, "Therefore, factors other than cost-effectiveness analysis must be relied upon to decide among pure and mixed forces."

What can one conclude from these statements relative to the cost effectiveness of the B–1 versus a standoff missile force?

What general data does the Department of Defense have that supports the general assertion that the B–1 is too expensive or not cost effective? Please provide those data for the record.

Answer. A key factor other than cost-effectiveness in affecting the B–1 decision was relative confidence in a cruise missile's ability to penetrate Soviet

air defenses, [deleted] vice the ability of ECM to get a bomber through those defenses.

The answer to Question #11 provides a more complete statement regarding factors in the decision.

The answer to Question #16 provides illustrative data on the relative cost-effectiveness of a B–1 vs. a cruise missile force.

Question 41. Dr. Perry, what in your opinion, is the minimum cruise missile range limitation we can accept at SALT II and still support the SIOP after the B–52 can no longer penerate?

Answer. I have not said that the B–52 will no longer be able to penetrate. However, I do think that 2500 km is the minimum acceptable cruise missile range.

Question 42. On page 2 of your statement, you indicate long range ALCM is capable of meeting most of the B–1 mission requirements. What mission requirements is it unable to meet?

Answer. The missions most difficult for the cruise missile to perform, compared to the B–1, would be deep strike missions (near the cruise missile range limit) and those against heavily defended targets having highly effective low altitude SAMs.

Question 43. You state the issue is not whether to have a *bomber* force, but how to weaponize such a force and that one option is to weaponize the force with long range cruise missiles to be launched outside the Soviet Union. Why is a force that does that, does not penetrate to deliver gravity weapons or SRMS called a *bomber* force?

Answer. We will continue to refer to the combined stand-off and penerating air breathing TRIAD force as a bomber force. For the present, at least, the stand-off cruise missile carrier will be a B–52 which will continue to be known as a bomber. If and when an all stand-off cruise missile force evolves, we may consider a change in nomenclature.

Question 44. Dr. Perry, previous testimony indicated the B–52 had been modernized to about the maximum possible. However, your request includes additional funds for this purpose. What more can be done with the B–52s? Is this a change over what the Committee had been told in the past?

Answer. The new B–52 efforts will concentrate on increasing aircraft effectiveness and reducing support costs particularly in view of the B–52s new and large role as a cruise missile carrier. Offensive avionics can be improved to enhance aircraft effectiveness and reliability. Reliability and maintainability programs for defensive avionics are now being initiated which previously had been deferred. The programs are not changed substantially from those previously briefed, but they have been accelerated and expanded.

Question 45. Dr. Perry, you state that the Administration proposes to maintain the B–1 R&D program at some level for the next few years. What is to be gained by doing this, and what will the program consist of? What transfer is liable to take place to support other programs?

Answer. The B–1 R&D program will be revised to delete those efforts applicable only to producibility and to tasks relating to deployment, maintenance and support. Items of AGE, training equipment, manuals, etc., will be deleted. On the other hand, performance of the variable engine inlet, the swinging wing, the offensive avionics, the defensive avionics and ECM, the supersonic flight of a large bomber configuration, and other tasks, which are already being examined by flight tests of the prototype airplanes, should be completed.

These data are not specific-design dependant and are valuable for the design and development of other weapon systems, e.g., updating the B–52, incorporating in future fighter design, enhancing the penetrativity of the second generation cruise missile, serving as basic data for a future bomber design, etc.

Question 46. You mentioned upgrading the FB–111 with some B–1 components. What programs do you have in mind in this regard? I am told that when the Supplemental Request was being put together that $70M was proposed to modify two FB–111s by adding the B–1 engine and stretching the aircraft. Why did the program drop out and at what level was it deleted?

Answer. The Air Force has been reviewing various alternatives for improving the effectiveness of the penetrating strategic bomber force. Enhancing the capabilities of the FB–111A is one viable alternative being actually considered. This alternative envisions a prototype development program, consisting of two aircraft to determine design feasibility. This would be a relatively low risk

effort, since it makes use of an existing design as the baseline and the already developed B–1 engines.

The prototype program could lead to a modification program for existing aircraft, production of new aircraft, or a combination of both of these.

The original concept was considered during the preparation of the Supplemental Request but was deleted by the Secretary of Defense because insufficient data and rationale were available to support the request. Subsequent to that the Air Force has been working to prepare supporting data and has just resubmitted their proposal. It is now under review in OSD.

Question 47. Dr. Perry, you are requesting $103 million for the Tomahawk air launched cruise missile (TALCM) and an additional $50 million for the air launched cruise missile (ALCM–B) in order to begin a restructured competitive program between these two systems. The following questions relate to this proposed program.

What is the estimated total cost of the development program for the ALCM assuming that it wins the competition and continues through engineering development?

Answer.

ALCM:

1978	173.9
1979	139.6
To competition	29.9
Total	343.4

What is the estimated total cost of the development program for the TALCM assuming that it wins the competition and continues through engineering development?

Answer.

TALCM:

1978	103.0
1979	98.2
To competition	28.2
Total	229.4

The TALCM funding requirement is contingent on the concurrent Tomahawk missile programs. If the schedules and funding levels of the Tomahawk programs should be changed, the TALCM funding has to be adjusted accordingly.

The development program is pointed toward a [deleted] IOC. What is the significance of that date, and how was it determined?

Answer. The [deleted] IOC was chosen as the point where the development of the cruise missile air vehicle and the nuclear warhead programs would be completed and enough production articles available for an initial limited operational capability.

Has SAC had an opportunity to comment on that particular IOC?

Answer. SAC is aware of planning factors established for currently prepared cruise missile programs and are planning for a [deleted] IOC.

How does this IOC relate to the IOC of Tomahawk and the one that was planned for the ALCM–A?

Answer. The submarine-launched Tomahawk has an IOC of [deleted]. The ALCM–B IOC was planned for [deleted] and ALCM–A on [deleted] consistent with DSARC II direction.

Referring to the ALCM–B portion of the schedule, $123.9 million was the amount in the FY 78 budget. How was it determined that an additional $50 million would be required to support this restructured program?

Answer. Additional requirements for vehicle design and fabrication, stretched rotary launcher, a new six position pylon, schedule adjustments and system tests.

Your total request for FY 78 is $173.9 million for ALCM and $103 million for TALCM. Why does the ALCM program require more funding during FY 78?

Answer. Concurrent development of the Tomahawk missile for the sub-launched, surfaceship launched and Ground Launched Cruise Missiles reduces the engineering and program effort for the TALCM. Any schedule or funding changes on the Tomahawk programs will affect the TALCM funding requirement.

In this program you are planning for each contractor to build 14 test articles

and conduct 10 test flights. How were these numbers determined? Why is it not possible to select the winning contractor with a lesser number of test articles and test flights?

Answer. The 14 test articles leading to 10 flight tests are felt to be the prudent number of articles and flights required to ensure complete demonstration and evaluation of all risk areas and to offer proper consideration for a flyoff.

Explain how you intend to select the final rack configuration for the B–52?

Answer. The final internal rack configuration for the B–52 would be dependent on the missile chosen for air launch as the optimum configuration of the rack is directly dependent on the peculiar missile design.

What compatibility will the selected rack have with a potential wide-bodied cruise missile carrier?

Answer. Only a limited amount of effort has been devoted to wide-bodied carriers, including method of carry and ejection. Thus, it has yet to be determined.

What, if any, relationship is there between rack selection and missile selection?

Answer. Each contractor will design and develop his own launcher to be optimally compatible with the specific missile.

You are planning on production funds of $40.6 million for ALCM and $64 million for the TALCM. How were those amounts determined and what will they buy?

Answer. Fiscal year 1978 production funds will be utilized for procurement of 12 full scale development type missiles, some long lead items, and associated tooling for each contractor to maintain the [deleted] limited initial operational capability. The total of $104.6 million is to be distributed appropriately between the ALCM and TALCM.

What additional procurement funds will be required for ALCM and TALCM during fiscal year 1979?

Answer. Fiscal year 1979 Procurement Requirements: The winning system will be funded with $95.6 million and the loser receives $46.5 million.

What components produced by the losing contractor will the Department be able to use?

Answer. About half of the navigation guidance equipment based on costs, would be retrievable for use on either the TALCM and ALCM and nearly 75 percent on the engine.

If the production funding did not begin until fiscal year 1979, what is the impact on the [deleted] IOC?

Answer. The [deleted] limited IOC would slip into early fiscal year 1981 or it could still be attained but with refurbished full scale development missiles. There would, however, be a significant gap from this point until additional missiles are received to build up operational capability with the attendant gap being in contractor manufacturing.

Question 48. Dr. Perry, during your initial presentation to the Committee on planned composition of our future strategic force, you did not cover how the wide-bodied cruise missile carrier fit into those plans.

Why is it that this program, for which you are requesting $90M, was not discussed relative to the Administration's plans for it in our future strategic force structure?

Provide a cost breakout and schedule on how you plan to use the $90M requested.

You are also requesting $2.5M to cover cruise missile carrier studies. It seems inconsistent to buy (or lease) a widebodied aircraft to demonstrate cruise missile carrier launch capability, when at the same time, you have yet to complete the CMC studies. Are these programs exploring two different areas?

Answer. Both the B–52 and the wide-body jet carrier offer early IOC's as cruise missile carriers. The B–52, however, with its existing and planned offensive/defensive avionics, represents the most cost effective cruise missile carrier in the near term. Current wide-body aircraft provide a platform should additional weapons carriage be required.

The $90M fiscal year 1978 funding for the cruise missile carrier aircraft program would support a system definition study and a flight demonstration phase which includes demonstration launches of the AGM–86B and AGM–109 from a carrier selected on the basis of the study. It is estimated that funding in support of the system definition study and flight demonstration would be about $50M. This includes aircraft leasing, flight test, contractor support, launcher equipment and limited avionics costs.

The remaining funding ($40M) could be used to establish a design and development basis to support a follow-on full scale development program, should this be desired.

The $2.5 million for advanced cruise missile carrier studies (strategic bomber enhancement, PE 63314F) is for conceptual studies of a possible new aircraft which could be used to carry cruise missiles well into the 1990s. The $90M program focuses on currently available aircraft only.

Question 49. You are requesting $10 million for the perimeter acquisition radar to develop software modifications to increase ICBM detection range and reentry vehicle traffic handling capability.

What is the total estimated cost of this program?

Is there a connection between this PAR and that used in the Safeguard program? If so, why is this an Air Force program?

What is the relationship between the need for this program and the decision to cancel B–1 production

If this program is completed, what would the SAC alert force gain in warning time?

Answer. Estimated cost for the system engineering and software development is $10 million.

Yes. This is the Safeguard PAR. In fiscal year 1977 the Congress directed that the Air Force assume responsibility for the PAR since the Air Force is primarily responsibile for providing strategic warning.

This improvement will help compensate for loss of TRIAD effectiveness caused by B–1 cancellation by enhancing the survivability and effectiveness of strategic forces and their employment. This modification will provide high confidence attack characterization on critical targets which will permit the NCA to make more effective use of the strategic bomber and cruise missile forces.

If the alert bomber force flushes on ICBM/SLBM initial warning, this modification would provide no improvement in warning time. The benefit from improved PAR, in conjunction with improved BMEWS, is an accurate, high confidence, attack characterization based on impact prediction of a large portion of RVs in the raid. With these improvements, this information is available to the NCA in time to make critical decisions regarding response options prior to RV impact.

Question 50. You are requesting $1.0 for BMEWS to initiate computer upgrade and radar resolution improvements.

What is the total estimated cost of this program?

How is this program related to the B–1 decision?

Answer. 1. Estimated total R.D.T. & E. cost is $18.3M.

2. This upgrade, in combination with the PAR modification, helps compensate for the loss of TRIAD effectiveness caused by B–1 cancellation by enhancing the survivability and effectiveness of strategic forces and their employment. These programs will provide high confidence attack characterization on critical targets which will permit the NCA to make more effective use of the strategic bomber and cruise missile forces.

Question 51. You are requesting an additional $8 million for missile surveillance technology to improve SLBM depressed trajectory warning time. What is the total estimated cost of this program? How is the increase to this program related to the B–1 decision?

Answer. The request is not to improve SLBM depressed trajectory warning time, but to enhance the probability of our having the very best technical approach in the development of a [deleted] which could become a follow-on to our current [deleted]. The estimated cost of the [deleted] Program is $108M through orbital demonstration. [Deleted] assured early detection of SLBM/ICBMS takes on added importance without deployment of the B–1 which had a rapid take-off capability. The additional funds requested are needed to assure that the advanced technologies being developed for an advanced missile surveillance system for deployment in the mid to late 1960's will be available. Within the budgetary constraints, the requirement for additional funds for this effort were lower in priority to the B–1 and therefore funds were not provided at an adequate level for continuation of the parallel contractor development of the [deleted] past early fiscal year 1978.

Question 52. You are requesting an additional $32.2 million for B–52 squadrons for an upgraded B–52 avionics suit, an improved inertial navigation system, and better reliability and maintainability.

What other items are included in this category?

How is the increase in this program related to the B–1 decision?

Are these programs geared to making the B–52 a more effective penetrator? If so, describe what those programs will consist of.

How much does the Department plan to invest in the B–52 force on penetration enhancement between now and 1985?

Are there additional programs, other than those requested, for the B–52 force that will be required as the result of the B–1 decision? If so, what level of funding would this require?

Answer. [Deleted.]

When the B–1 was cancelled, [deleted] a program to update the B–52G/H bombing navigation system (BNS) was already defined and in RDT&E. This system was to begin coming off the modification line in fiscal year 1982. The requirement to be cruise missile capable was set for fiscal year 1980. The avionics program then was accelerated to close the gap between the two programs and to provide more reliable and accurate inflight missile initialization data. The maximum acceleration possible for the BNS was one year to June 1981. Therefore, an ongoing program, B–52 Avionics Update, was accelerated to close the time gap between it and the designated operational capability date of the cruise missile.

Yes, these programs will benefit the penetrativity of the B–52. The resultant BNS will increase the system reliability [deleted]. Increases of system availability in the primary mode coupled with increased system accuracy will allow crew to fly lower to avoid defenses and reduce amount of aircraft electronic transmissions for fixing. The sum of increased reliability, confidence to maintain lower altitudes and exact flight paths, and reduction of subsystem fixing transmissions will increase the B–52 penetrativity.

All investments in the B–52 force will in some way affect its ability to perform its assigned missions. Assigning a percentage of a modification program to penetration enhancement would be difficult because of the multiple effects and advantages gained from a modifiction. In some specific cases it may be easy to determine, but on the whole it would be very difficult. For example, a reliability and maintainability modification to an ECM system may reduce support costs, reduce maintenance work hours, increase training plus contribute to penetration enhancement. A modification to the bombing navigation system may contribute to all of these individually and collectively. Programs have not been labelled as specifically for penetration enhancement, they are collectively beneficial and mutually reinforcing.

The total amount programed for the B–52 through the planning period (fiscal year 1979–83) is approximately $2.7 billion. The amount represents all hardware purchases, spares, and installation labor.

Additional programs may be required as the threat evolves and the new force structure capability becomes clearer. The B–52 will require modification to continue as a penetrating bomber into late 1980's and beyond. Studies now in progress or to be initiated in fiscal year 1978 will narrow down the possible alternatives, place an effectiveness value on them, and determine a program cost.

Question 53. You are requesting an additional $2.5 million for strategic protective systems to accelerate development of B–52 electronic warfare systems.

A. How is the increase in this program related to the B–1 decision?

B. Do these programs enhance the ability of the B–52 more in the penetration or the stand-off mode?

Answer. A. The decision to cancel the B–1 production program requires that additional emphasis be given [deleted] the defensive electronic warfare (EW) avionics of the B–52 aircraft. In view of the B–1 decision, the Air Force must [deleted] assure that this [deleted] EW capability is available for the B–52 [deleted].

B. Three of the four projects, considered in this request, provide the same capability enhancement regardless of the mission of the B–52. [Deleted.] These projects are: (1) Improvement to the ALQ–117 ECM System [deleted]; (2) Communications/IFF Countermeasures [deleted]; and (3) the [deleted] Flare Program [deleted]. The fourth project, [deleted] is intended to enhance the B–52 primarily during penetration. [Deleted.]

Question 54. In the procurement account for B–52 modifications, you are requesting an increase of $33 million, primarily for Reliability and Maintainability mods.

Is the amount for the R and M mods based on the B–1 decision?

If so, how?

Answer. These R and M mods were scheduled to be started into the B–52 modification program at a later date. Funding reductions have prohibited these projects from being initiated. With the increased emphasis on modernizing the B–52, the list of deferred reliability and maintainability projects was reviewed to determine which should be accelerated. The items contained in the requested increase are those which are the most critical and ready for modification.

Queston 55. Who has the overall responsibility for the cruise missile carrier program?

Answer. The Air Force has overall responsibility for the cruise missile carrier program. OSD will be heavily involved in the early program stages.

Question 56. How dependent is a cruise missile CEP on the navigation accuracy of its carrier? Is it correct that a cruise missile carries with it any error inherent in the carrier's navigation system at the time of launch?

Answer. The initial navigation error introduced by launch platform location uncertainty is largely removed by the first TERCOM fix. It is important that the initial position error plus the cruise missile navigation system error propagation rate not be so large as to cause the missile to miss the first TERCOM fix area. The size of the first TERCOM fix area is based on our estimate of these errors.

Question 57. Is there going to be a requirement for an increased number of tankers to support the new strategic force structure?

Answer. When viewed in isolation, there are adequate tanker forces to support the strategic mission; however, there are some situations where multiple tactical and strategic support missions could occur simultaneously. In some cases, there are insufficient resources to meet these simultaneous needs. As a result it will be necessary to continuously evaluate the tanker force in light of force structuring decisions. Also, we are currently strapped for sufficient tankers to support the increasing demand of the General Purpose Forces.

Question 58. What is the total program cost estimate of the ASALM missile program? What quantity of missiles are considered in this program?

Answer. The total R.D.T. & E. program costs of the accelerated ASALM program are estimated at $661 million in fiscal year 1977 dollars. This estimate is for the 168-inch missile and an IOC of fiscal year 1984–1985. This estimate includes completion of the Propulsion Technology Validation (PTV) program and R.D.T. & E. funds spent in prior years. The ASALM can be used against a variety of targets and target combinations. [Deleted.] Force mix studies to determine the required number of missiles in the outyears are currently being conducted.

Question 59. What effort will be accomplished with the accelerated ASALM missile program?

Answer. The effort includes the Propulsion Technology Validation (PTV) program, a 30-month two-contractor competitive validation flyoff and a 33-month single contractor Full-Scale Engineering Development phase. Approximately one year will be required prior to start of the validation flyoff to complete the various pre-award activities. The activities include finalizing the design and planning efforts required to enter the validation phase.

Question 60. What problems are being experienced with the engine liner and when will this problem be solved?

Answer. The ramjet insulation material which protects the ramjet chamber during ramjet engine operation failed or seriously degraded during recent low-high-low trajectory simulations. The material had performed satisfactorily under most previous test conditions. The material must not only provide adequate insulation during the ramjet mode but must also be compatible with the design constraints imposed by the rocket mode. A Dow Corning 93–104 silicon rubber material has been used in most of the technology work to date. Although the test failure occurred with one engine design and may be peculiar to that design. it is not yet certain that DC 93–104 will be acceptable for all missions in any of the ramjet configurations.

This problem can be solved through design or material changes with accompanying verification testing. A program to develop the two alternate concepts is prepared and awaits the conclusion of August (77) testing before initiation.

The liner work to date has been focused on the nominal baseline ASALM type mission with flight times of 10–20 minutes. We have successfully accumulated 30 minutes of operating time with a DC 93–104 lined chamber at high altitude conditions.

Question 61. Are the constraining size limits of the ASALM caused by the B–1 aircraft configuration still valid since the termination of the B–1 program?

Answer. No. The B–52 bomb bay could now be considered the limiting factor. The additional approximate 151 inches of bomb bay length could be used to accommodate a longer missile.

Question 62. What are the design-to-cost goals established for the ASALM missile program?

Answer. The program is currently in advanced development and only preliminary program cost estimates have been made. These will be converted into firm design-to-cost (DTC) goals prior to going into Full Scale Engineering Development.

Question 63. If there are no design-to-cost goals established for this ASALM missile at this time, then how can any reasonable constraints or measures be considered by both the contractors and the Government to evaluate the competing ASALM missiles?

Answer. A significant portion of the effort leading to source selection for the competitive flyoff, as well as during the Validation Phase, will be the contractor-government effort to formalize the design-to-cost goals as the system design matures. The initial cost estimates cannot be formalized or considered firm prior to the Milestone II decision since systems are not adequately defined and the values for these system parameters remain uncertain during the early phases of the system acquisition process.

The purpose of the competitive Validation Phase flyoff is to develop the most cost effective system to take into Full Scale Engineering Development and subsequently into production.

Question 64. Some of the accelerated funding is planned to be expended for design effectiveness trades? Why should the program flyoff be accelerated at this time and give specifications to the contractors when at this same time design trades are being made?

Answer. The competing contractors on the ASALM technology development were tasked to design a system to meet a need rather than given a systems specification to built-to. These design studies have been underway since May 1976. They will be completed during the next few months. At that point, the pre-award contractual cycle will begin based on the proposed designs. These design studies are a prerequisite to entry into the Validation Phase prototype flyoff. The program acceleration is achieved through accelerating (or cancelling) the Propulsion Technology Validation and starting the flyoff a year earlier than originally planned. The competitive nature of the program will keep the technical risk at an acceptable level.

Question 65. Some of the fiscal year 1978 funding for the ASALM missile applied to design efforts to reduce the radar cross section. How can it be reasonable, effective, or practical to accelerate the flyoff of the ASALM missile advanced development program when the funds are being spent for redesign effort to reduce radar cross section?

Answer. The external configuration of the ASALM is relatively fixed at this point in the design cycle. This fact allows for orderly acceleration of the flyoff.

The radar cross section (RCS) "redesign effort" involves the possible use of new materials and technologies [deleted]. These studies do not preclude accelerating the flyoff since there is sufficient time available during subsequent full scale development tests to evaluate their effects on RCS.

Question 66. Have the competing contractors been advised or will they be required to prepare life cycle cost estimates for the flyoff program for the ASALM missile?

Answer. The requirement for life cycle cost (LCC) estimates is already on contract as part of the competitive Technical Integration Studies being conducted by Martin-Marietta and McDonnell Douglas. This requirement will continue as part of the Validation Phase contracts.

Question 67. Is this program now being conducted to conform to the procurement procedures of the A–109 directive?

Answer. Yes.

Question 68. Why should this program be accelerated to a flyoff effort until design factors, cost goals, and procurement practices are met and each competitor and the Government are working toward common goals?

Answer. The Government and the competitors are already working toward the common goal of developing the most cost effective ASALM possible. The design factor studies are underway by both Martin-Marietta and McDonnell

Douglas and will be a significant part of the contracting efforts that will lead to the accelerated flyoff. Cost goals will be finalized based on the Validation Phase flyoff results and will be considered firm prior to the Milestone II decision on whether or not to enter into Full Scale Engineering Development. Standard procurement practices will be followed in contracting for the Validation Phase flyoff. The fact that the program is being accelerated does not disrupt the orderly system acquisition process.

QUESTIONS SUBMITTED BY SENATOR JESSE HELMS

Questions submitted by Senator Jesse Helms to Dr. William J. Perry, Director, Defense Research and Engineering, Department of Defense, to be answered for the hearing record.

[The questions, with answers supplied, follow:]

Question. Has the Administration given up the idea for the long term of having a penetrating bomber, or will we have an all stand-off force?

Answer. Some B–52's will deploy as stand-off bombers as soon as the air launched cruise missile is available. We will continue to use FB–111's and other B–52's as penetrators as long as permitted by Soviet defenses.

Question. How will the United States cover an estimated [deleted] of Soviet targets that are believed to be unable to be reached by a cruise missile with a 2,500-km range?

Answer. Depending upon the 2,500-km range limitation definition, the launch point, and the defense assumptions we estimate that about [deleted] of the Soviet target base could be covered by a 2,500-km range cruise missile. Our ICBM's and SLBM's can in combination cover [deleted] Soviet target base.

Question. What consideration is the Administration giving to a rumored replacement for the B–52, in the form of a stretched F–111 utilizing B–1 bomber engines, as a penetrating bomber?

Answer. Consideration of this option has been largely confined to the Air Staff. If the Air Staff review is favorable a detailed proposal for development will be brought forward to OSD.

Question. What is the maximum deliverable megatonnage to Soviet hardened targets now planned for the cruise missile? How much can a B–52 deliver to the same site? The B–52? A modified F–111?

Answer. The maximum megatonnage that can be carried by a single cruise missile is [deleted]. Assuming a buy of 3,000 missiles, the total megatonnage available would be [deleted]. The percent of cruise missiles to be employed against hard versus other types of targets has not yet been determined. The maximum carriage potential of the B–52G/H is [deleted] considering internal carriage of [deleted] SRAM and [deleted] gravity weapons only. The previously projected B–1 is capable of carrying [deleted] internal weapons for a total of [deleted] while a modified FB–111 is projected to be capable of carrying [deleted] gravity weapons internally [deleted] and [deleted] externally [deleted] for a total of [deleted].

Question. How many contractors does the Department of Defense plan to use for the manufacture of the cruise missile?

Answer. The number of cruise missile manufacturers will be influenced by the outcome of the competition between Boeing and General Dynamics for the air launched cruise missile design. The winner of the competition will be awarded a contract to complete full scale development and for limited production, including options for follow-on production. We are also planning to include in the contract provisions for production rights and data. This procedure would provide the option to award follow-on production contracts to a second source. The existing contract with General Dynamics, for Tomahawk design and production, has similar provisions. We expect to select the air launched cruise missile design (and manufacturer) by November 1979.

Question. Would the Department of Defense give figures as to past cost-overruns on contracts and projects involving potential contractors for the cruise missile, including Boeing, General Dynamics, Teledyne, etc.

Answer. The number of potential cruise missile contractors is quite large and, therefore, we plan to limit review of the past performance of contractors to

those who actually bid on cruise missile contracts. I must point out that past performance, including cost-control, is just one factor to be considered in source selection. I cannot, therefore, provide to you review of past cost-overruns of potential cruise missile manufacturers in absence of the total source selection criteria results.

Question. What advantage does the Department of Defense see in having a sole-source contractor for the cruise missile? What possible disadvantages are seen? What possible advantage does the Department of Defense see in having a number of contractors for the cruise missile (at least more than one contractor)? What disadvantages?

Answer. A full answer to your question could encompass most of the considerations that lead to OMB Circular A–109. In brief, the Department of Defense recognizes the benefits of competition in major weapons systems acquisition. We have emphasized competition in the cruise missile acquisition strategy for development and initial production. As noted earlier, we also plan to provide the option for competition in follow-on production.

APPENDIX B

Subsequent to the hearing, the following questions were submitted to the witnesses to be answered for the hearing record by August 17, 1977.

[The questions, with answers supplied, follow:]

QUESTIONS SUBMITTED BY SENATOR McINTYRE ON BEHALF OF MEMBERS OF THE SUBCOMMITTEE

Question. The fiscal year 1978 authorization request contained $40.6 million to initiate production of the ALCM missile. This procurement funding request was justified as required to fund tooling startups and procurement of some long-lead material components to meet an initial operating capability in the summer of 1980 for the ALCM–A missile and in the summer of 1981 for the ALCM–B missile.

The amended budget request to support initial procurment funding for both the ALCM/TALCM missiles is for $140.6 million to meet an IOC of [deleted.] This funding request contains only $50.9 million for tooling startups and long-lead components and the remaining $53.7 million is for the actual assembly and integration of both the ALCM and TALCM missiles.

Please explain how it is reasonable and economically practical to plan on funding only $50.9 million for the initial procurement effort for two different types of cruise missiles with a much accelerated IOC when the Air Force just a few months earlier has indicated $40.6 million would be needed to fund the initial procurement effort of a single missile the ALCM? Is the Air Force procurement funding for this new competitive program being funded with the same concern for meeting good procurement practices as stated in support of the $40.6 million in the fiscal year 1978 budget for ALCM or is the amended budget procurement profile based on your procurement practices with soft tooling, uneconomical planning, and unreasonable cost impact?

Answer. The program being requested introduces an air-launched cruise missile as soon as practical at a reasonably low cost, using sound business practices—an orderly logical program. While the fiscal year 1978 authorization request contained $40.6 million for tooling and start-up with initial production quantities funded in fiscal year 1979, the current program introduces competition and provides $82.6 million for the procurement of 24 missiles (12 each) and $22.0 million for tooling and start-up—$11.0 million per contractor. The reference to $50.9 million for initial procurement for two types of cruise missile contains the subcontracts/materials associated with the procurement of 24 missiles, i.e., $82.6 ($28.9 for materials and $53.7 for labor). The remaining $22.0 million for tooling and start-up represents, what we feel to be the minimal cost to provide an efficient warm production base from which the winning contractor can phase into quantity production in an orderly fashion. Additionally, these procurement funds spent in this time frame provides each contractor an opportunity to better define production costs.

Question. The procurement plan as described to the staff for the fiscal year 1978 amended budget request for the TALCM/ALCM procurement is based on a 12 missile procurement primarily to maintain a warm production base until the competitive selection is made. Couldn't this same procurement plan to maintain a warm production base be accomplished by purchasing only 8 missiles from each contractor or even only 6 missiles from each contractor at this time? How much reduction in the fiscal year 1978 amended budget could be realized if only 8 missiles were planned for with this funding?

Answer. The 24 missile procurement, 12 from each contractor, is based on the missile requirements to establish a limited initial operational capability of [deleted]. Maintaining a warm production base (not IOC) would also be ac-

complished with 8 missiles from each contractor. A reduction of about $25 million in the fiscal year 1978 budget would be realized if only 8 missiles were provided from each contractor.

Question. What other options are available for the procurement funding for the fiscal year 1978 budget amendment for the ALCM/TALCM missile program?

Answer. The $104.6 million being requested represents the most efficient means of maintaining a warm production base for each of the two competitors. Other than the minimum quantity and dollar cited in question No. 2. there are no other viable production options for maintaining a warm base. Again, this will not support the [deleted] IOC.

Question. What is the total cost for the ALCM program if selected? For the TALCM program if selected?

Answer.

Total cost of ALCM:	
Development	$343.4
Production	2,305.2
	2,648.6
Total cost of TALCM:	
Development	229.4
Production	2,305.2
	2,534.6

These costs do not include the 409 million sunk in ALCM if TALCM is selected or the 297 million in TALCM if ALCM is selected or the approximate 1.8 million per aircraft to modify the B–52.

Question. What amount of procurement funding for this competitive ALCM/TALCM program would not be required if a competing missile were selected prior to procurement funding being obligated?

Answer. The savings would occur in fiscal year 1978, $42.3 million, and fiscal year 1979, $43.5 million, wherein only one contractor would be funded for procurement of missiles. This approach would not satisfy the [deleted] IOC, nor maintain a warm production base.

Question. Captain Locke, the subcommittee was advised during its most recent hearing that the selection of an air-launched cruise missile airframe prime contractor would be made in October 1979. In order to assess the cost-effectiveness selection option earlier than that date, please provide to the subcommittee an analysis of the relative research and development and procurement costs savings, if any, that could be realized if the selection is made in:

(*a*) October 1977,
(*b*) April 1978,
(*c*) October 1978; and
(*d*) April 1979; and
(*e*) October 1979?

Answer. Shown below is a chart reflecting the maximum potential savings if either of the competing concepts were chosen at any of the five suggested selection points. An ALCM development cost base of $343.4 million and TALCM development cost base of $299.4 million with total procurement costs of $2401.0 million was the basis:

Time of selection	October 1977	April 1978	October 1978	April 1979	October 1979
ALCM selected:					
Potential R. & D. saving	$201.2M	$123.9M	$98.2M	$24.5M	
Potential procurement saving	95.8M	75.6M	43.5M	12.6M	
Total, potential savings	297.0M	199.5M	141.7M	37.1M	
TALCM selected:					
Potential R. & D. saving	313.5M	174.7M	139.6M	27.9M	
Potential procurement saving	95.8M	75.6M	43.5M	12.6M	
Total, potential savings	409.3M	205.3M	183.1M	40.5M	

Question. What are the relative risks stated in terms of estimated costs that are associated with each of the above alternative dates of selection?

Answer. The relative risks in terms of estimated costs use the estimated total development and procurement costs as a base:

Date of selection	Total costs to go	Estimated risk
October 1977	$2,953.8M	$1,476.9M
April 1978	2,715.0M	1,357.5M
October 1978	2,952.3M	1,166.5M
April 1979	2,347.1M	704.1M
October 1979	2,215.4M	332.3M

At this point, there are risks in both the ALCM and TALCM. The ALCM missile has yet to be modified to its long range (ALCM–B) version while the TALCM missile has not been flown from the B–52.

By April 1978, government conducted designed reviews should be completed but substantial flight quality hardware would not be available from both contractors. Selection of a contractor at this point would have to be based on analysis of contractor proposals and very limited flight data.

Source selection in October 1978 could utilize data from ground tests and component production. Limited system production data should also be available.

An April 1979 selection would come after the initial flight tests. Significant system ground test and actual production cost data would also be available for evaluation.

Question. What, if any, cost savings could be realized if some of the major components of the air-launched cruise missile are separately competitively tested and selected earlier, and apart from the airframe prime contractor selection?

Answer. Separate development and testing programs have already been through competitive flyoffs for the cruise missile turbofan sustainer engine and land attack guidance set. The proposed flyoff is between the two individual air vehicle contractors, each having government furnished engine and guidance equipment but each providing the integration of the missile system into the B–52 weapon system. Any further breakout at this point in development would not be cost effective.

Question. What are the costs if any, associated with the airframe prime contractor competition for the air-launched cruise missile in relation to the sunk funds for assets common to both cruise missiles?

Answer. Under the flyoff ground rules, the development of common components, sustainer engine and navigation/guidance equipment, will continue to be conducted under government contracts directly to Williams Research (sustainer engine) and McDonnell Douglas Astronautics—East (navigation/guidance equipment). This hardware will be provided to both competing airframe contractors as government furnished equipment. Accordingly, there are no anticipated contractor costs expected for the development of either the sustainer engine system hardware or navigation/guidance equipment.

Question. Earlier testimony received by the Subcommittee from Captain Locke indicated that if the warhead was included as practically the same there would be a high cost commonality of upwards to three-quarters between the ALCM and Tomahawk missiles by the time of IOC or fruition of these missiles. Testimony received recently by Captain Locke before this Subcommittee, however, indicated that this 75 percent commonality estimate would be only in the engine. Has the difference between the Tomahawk and ALCM missiles been changed significantly when applying this effort to the TALCM and long range ALCM to warrant a significant decrease in commonality?

Answer. The costs of producing the nuclear warhead, which is common to both air vehicles, is assumed to be [deleted]. In terms of cost, the engine is approximately 75 percent common and the guidance approximately 50 percent common. This equates to approximately 75 percent commonality between the ALCM and the Tomahawk.

Question. What percent of commonality for cost purposes can essentially be obtained with these ALCM and TALCM missiles? Please explain where the significant differences are between these missiles that precludes further commonality?

Answer. It is felt that, given the design and configuration differences between the ALCM and Tomahawk airframes, the currently estimated 75 percent com-

monality is the maximum achievable. The physical differences in the two airframes preclude further commonality.

Question. While it is the Subcommittee's purpose at all times to foster and promote competition whenever possible, it is also the Subcommittee's concern that either some technical or cost achievements be expected from competition. However, when significant percentages of the competing systems are expected or projected to be essentially common as would appear in this case, then the competitors only have a limited amount of cost in which to compete. In these cases, it is essential to be closely aware of a cost "buy-in" anticipation of future procurement programs.

Answer. Cost credibility will be a critical factor in the source selection. Contractor cost estimates for the flyoff test articles will be carefully analyzed and evaluated both for their realism and achievability in the development program and also for the relationship these articles have to be proposed production design. Consideration will be given for differences in both configuration and production technique. As part of the source selection process, government "will-cost" teams will conduct intensive investigations of actual costs of producing the test articles to make detailed comparisons between the contractor's actual versus his estimated costs. This process will provide unusual insight into each contractor's ability to both forecast and control his costs.

Question. Is there any work effort included in this accelerated program that was not planned for future B–52 funding regardless of the B–1 termination decision?

Answer. No, all the work in the accelerated program had been planned for future years. The program was accelerated to deliver first avionics modified aircraft one year earlier

Question. What is the total cost of the B–52 avionics update program including procurement and operation and maintenance funding?

Answer. The total cost of the avionics update program in fiscal year 1977 dollars is $695.1 million. The amount is broken into $106.4 million for R.D.T. & E. and $588.7 million for procurement, spares, and installation.

Question. What is the schedule for the avionics update modification including the initial modificaiton to the completion of all of the B–52 aircraft to be modified?

Answer. The following is the planned modification schedule. Modifications will be accomplished during the normal periodic depot maintenance (PDM) cycle and thereby would not affect aircraft availability for alert.

Initial Aircraft In: [Deleted].
Initial Aircraft Out: [Deleted].
Average Subsystem Lead Time: 18 months.
Aircraft Downtime (PDM): [Deleted].
Aircraft Out: Fiscal years 1981 through 1986 [deleted].

Question. Can this modification program be accelerated with a "fly-in" effort and what is the cost and schedule for the accelerated effort?

Answer. Yes, the modification schedule can be accelerated with a periodic depot maintenance (PDM) plus fly-in program. This type of program could double the annual output [deleted]. Total aircraft available for generation would be reduced. Using estimates of out-year escalation rates, the PDM plus fly-in program would cost approximately 5 percent less. This reduction is based on the combined advantages of large unit buying on the front end and avoided out-year labor escalation costs in the out-years. The schedule for PDM plus fly-in would be:

Initial Aircraft In: [Deleted].
Initial Aircraft Out: [Deleted].
Average Subsystem Lead Time: 18 months.
Aircraft Downtime (PDM+Fly-in): [Deleted].
Aircraft Out: Fiscal years 1981 through 1984 [deleted].

Question. Does the Air Force plan to modify the B–52D aircraft with the avionics update as well as the B–52 G&H aircraft?

Answer: The mission chosen for the B–52D will determine its avionic update configuration. If the mission is to be a cruise missile carrier, the B–52D would receive the same offensive avionics update package as the B–52G/H. This package is required for reliability, accuracy, and missile launch capability.

If the B–52D is not ever to become a cruise missile carrier a reliability and maintainability modification (Class IV) is required. [Deleted.]

Question. What portions of the B–1 offensive avionics will be used with the B–52 avionics update program?

Answer. The B–1 Offensive Avionics program was evaluated for technology transfer benefits when the B–52 program was formulated. The idea was to make maximum use of the B–1 development effort. The areas in which the B–1 could contribute were the learning curve established for avionics integration and the related software and computer language. The knowledge gained from B–1 investments in these areas will be applied to the B–52.

Question. Why aren't the B–1 offensive avionics subsystems being incorporated into the B–52 aircraft?

Answer. Some of the B–1 development subsystems are being evaluated for incorporation into the B–52. However, subsystem technology, performance, and subsystem support costs have changed considerably since the B–1 off-the-shelf system was directed. The B–52 does not have this same restriction on its subsystem selection. The B–52 effort is largely an integration effort combining current technology subsystems (1977/78) using as much of the B–1 integration knowledge that is applicable. The result will be to build the most effective bombing navigation system (BNS) to accomplish the variety of B–52 mission taskings.

The following graph breaks out the major subsystems and reasons for differences.

B–1 ----------
B–52 ---------- [Deleted]
Why B–52 different----------

Question. Will the offensive avionics update modification for the B–52 aircraft provide the Air Force with the most modern up-to-date avionics that can be obtained to meet the future requirements of the B–52?

Answer. Yes, the B–52 Avionics Update Phase One will provide the most modern avionics that can be obtained to accomplish the B–52 mission.

When formulating the update, the predicted strategic requirements for the mid-1980's were used. The system planners had to face a large tradeoff decision. On one hand, the B–52 G/H [deleted]. Because of the urgency to start the update, these out-year systems were retained in development and labelled as Phase Two. Incorporation of these modifications would be delayed until subsystems are fully developed.

Question. Will the B–52 offensive avionics be better or equal to the offensive avionics planned for the B–1 aircraft?

Answer. In the areas where there is similarity of subsystems (e.g., inertial nav system (INS), doppler radar, computer/processors, radar altimeter and attitude heading reference system (AHRS)), the offensive avionics planned for the B–52 will be [deleted].

Question. Is the EAR radar now needed for the B–52 aircraft program?

Answer. The development program for the electronically agile radar (EAR) will not be completed when modification starts for the avionics update. This highly capable system was therefore deferred for later integration. This is the primary part of the Phase Two Update program retained in development. Retention and continuation of this effort is recommended for out-year modification to the penetrating bomber portion of the strategic force.

Question. Are there any funds in this accelerated budget request to study avionics requirements beyond the mideighty time period?

Answer. Yes, the accelerated program for fiscal year 1978 includes $2.0 million for studies to define the outyear B–52 update requirements. The study will be divided into two areas. For offensive avionics, expansion and review of the Low Life Cycle Cost Avionics (LLCCA) Study will be accomplished. This will be a minor effort. Most of the study will look into basic aircraft systems (e.g., control, power, and structure) and determine if the life extension requirement will require aircraft system upates. The study will evaluate requirements and present systems and then, if required, recommended prototype and/or modification efforts.

Question. How many B–52 aircraft will be in modification for this avionics update program at any given time? What is the maximum number of aircraft down for modification and when is this time period? What is the number of aircraft in modification at any time with an accelerated "fly-in" program?

Answer. Under current planning, the avionics would be installed during the regular periodic depot maintenance (PDM) cycle. No additional aircraft down

time other than normal would be required using the PDM cycle. The number in PDM varies from [deleted] aircraft. The maximum number of B–52G/H aircraft down at any one time would be [deleted]. The maximum time in a PDM cycle is [deleted]. The number of aircraft down for a PDM plus fly-in program would be between [deleted]. However, the PDM cycle for B–52 modification will be adequate to support the planned missile production rate building to [deleted] missiles per month.

Question. Will the B–52 avionics be nuclear hardened and if not, why not?

Answer. Yes, [deleted]. Another effort under B–52 Squadrons is the continuation of the Nuclear Hardness Study. Information from this study, analysis, and test program will in turn be incorporated into the update avionics.

Question. What is the pacing item on the acceleration of the B–52 avionics update program?

Answer. The pacing item is software development and then the associated ground and flight testing of the software. The major task of the avionics program is subsystem integration and the software will be the key item in making the total system perform.

Question. Why were the programs added to the Strategic Protective Systems area not included in the initial fiscal year 1978 budget request?

Answer. With the exception of the Communications/IFF Countermeasures Project, the remaining three projects, included in this request, were included in FY 78 budget request. [Deleted.] With the cancellation of the B–1 production program, acceleration of three of the four projects in this request and the initiation of the Communications/IFF Countermeasures Project is required [deleted].

Question. What direct relationship does the addition of funds to these strategic protective system programs have to the decision to terminate the B–1 program?

Answer. The decision to cancel the B–1 production program requires that additional emphasis be given to improving the defensive electronic warfare (EW) avionics of the B–52 aircraft. [Deleted.]

Question. The Committee staff has been advised that nearly all of this requested additional funding will be used during the third and last quarter of fiscal year 1978. Since this plan for use of funding does not seem to justify immediate need for funding for this program, what effect will there be if these items were deferred until the subsequent fiscal years?

Answer. Before fiscal year 1978 R.D.T. & E. funds for each of the four projects, included in this request, can be obligated, appropriate engineering specifications and program documentation must be prepared, approved and negotiated. The procurement lead time involved precludes contractual obligation of the requested funds any earlier than time periods indicated. If the requested additional funds are not approved, three of the four projects, included in this request, will not be started until late in the last quarter of fiscal year 1978. The remaining project, Communications/IFF Countermeasures, would not be started in fiscal year 1978. These actions result from the level of available funding contained in the original fiscal year 1978 President's Budget for this program element. The consequence of not obtaining the requested additional funds is to stretch out the development cycle for each of the four projects, included in this request, from one to five months depending on the project involved. [Deleted.]

Question. What are the total estimated costs of these programs including procurement and modification costs and when will these programs become effective in the B–52 aircraft?

Answer. The total estimated costs of the four projects, included in this request, are shown below. These costs include procurement and modification costs. The estimated dates that these projects become effective are shown.

(1) ALQ–117 ECM System Improvement: R.D.T. & E. total is $10.4 million; procurement total is $165 million. [Deleted.]

(2) [Deleted.] R.D.T. & E. total is $6.2 million; procurement total is $9.0 million. [Deleted.]

(3) Communications/IFF Countermeasures: R.D.T. & E. total is $8.7 million; procurement total is $50 million; [deleted].

(4) [Deleted.] Flare Program: R.D.T. & E. total is $1.1 million; procurement total is not available since this is a replenishment supply item procured on a continuing basis. [Deleted.]

Question. Why are additional funds being requested for the tactical warning improvements in this budget amendment?

Answer. To improve our tactical warning and missile attack assessment capabilities which will enhance the NCA decision making options and effectiveness of our strategic forces.

Question. Since the B–1 termination decision will have no apparent impact on the deployed strategic aircraft posture for the next two years or more and since the B–52 force structure will be essentially as anticipated when the fiscal year 1978 budget was initially presented and authorized, why can't this accelerated funding for warning improvement be deferred until fiscal year 1979?

Answer. The operational dates for these improvements range from fiscal year 1979 for the Perimeter Acquisition Radar to the mid–1980's [deleted]. The BMEWS and Warning Information Correlation improvements will be operational in fiscal year 1980 to fiscal year 1983. Therefore, these initiatives will be effective in the same time frame as the other program impacts of the B–1 decision.

Question. Were each of the programs in this area of tactical warning improvements included in the five year defense program and if so, when were they planned to start? If not, why not?

Answer. All of the efforts but the Perimeter Acquisition Radar improvement are in the five year defense plan. The initiatives in Missile Surveillance Technology and Warning Information Correlation are to decrease development risk and provide a better product. The BMEWS radar resolution improvement was planned to start in fiscal year 1979 but this decision came too late to get the necessary system engineering effort into the fiscal year 1978 budget request. The recommendation on the PAR improvement was also after the fiscal year 1978 budget request.

Question. The Air Force plan for this missile surveillance technology program as presented in the original fiscal year 1978 budget funding of $11.6 million was to have a competition to select a single contractor in early fiscal year 1978 to continue the development program. Why should additional funds now be requested just to pay for maintaining both contractors for a longer period?

Answer. The desire to continue the competition is to enhance the probability of achieving the very best technical approach in the development of the [deleted]. The sensor to be developed is planned for orbital demonstration prior to making a decision relative to a [deleted]. The technology being pursued by the two contractors is uniquely different, and while only one contractor will be selected to provide the hardware for the demonstration flight, there is high probability that technology from both of the concepts will be of value in the development of an advanced missile surveillance system.

Question. The Committee staff has been advised by Air Force staff that the cost to continue this 2nd contractor in the development program will be $8 million in fiscal year 1978; $16 million in fiscal year 1979, and another $5 million in fiscal year 1980 or a total of an additional $29 million. Is this total funding estimate to pay for a second contractor for a longer period still a valid figure and has the Air Force analysis determined that this is an absolutely necessary expenditure of funds?

Answer. The Air Force estimate of continuing the parellel development effort through fiscal year 1978 and 1979 is $8 million in fiscal year 1978 and $16 million in fiscal year 1979. This includes extending the parallel effort until approximately mid fiscal year 1979 to the Preliminary Design Review for the [deleted] program and also includes funds to consider the feasibility of protecting such a sensor [deleted]. The latter effort will continue through the design, development and test phase in the [deleted] program. The Air Force believes the expenditure of the additional funds is highly desirable. The figures requested are still valid.

Question. If Air Force analysis shows this to be an effective expenditure of funding, why wasn't this funding requested in the initial fiscal year 1978 budget and the determination made earlier this year to continue both contractors in development?

Answer. The Air Force did earlier consider requesting additional funds to continue the competitive [deleted] development phase; however, the funds were not requested in preference to other items (such as B–1). Additionally, progress made by the [deleted] contractors, since the time of the original fiscal year 1978 budget presentation has made it much more desirable to continue the parallel development effort until Preliminary Design Review; which would now be about March-April 1979. This would make much better data available for the selection of the sensor approach to be demonstrated in orbit. It will also provide more

complete technology of both of the options for eventual application to the design [deleted].

Question. What would be the effect on this program if this $8 million being requested in this budget amendment was not approved and why would this effect be any different than the effect and risk accepted by the Air Force in presenting the initial fiscal year 1978 budget request without this funding?

Answer. If the $8 million is not approved, the original approach will be followed; however, the selection of the sensor to be developed for the demonstration flight will be made at an earlier date. This will increase the program risk and will obviate the advantage of competitive incentive for superior technology and schedule. Further, termination of one effort at this time will reduce the potential for exploitation of that approach in the design and development [deleted].

Question. What is the total cost estimate for this program as determined at this time?

Answer. The total for the [deleted] is $107.8 million. This includes the $29 million additional requested for the continuation of the parallel development effort.

Question. Why are the funds being requested in this fiscal year 1978 budget amendment, when there was no requirement for these funds either in the submission of the initial fiscal year 1978 budget nor during testimony to the Committee by the Air Force during the budget hearings?

Answer. The requirement for radar resolution portion of the BMEWS upgrade was being assessed when the initial fiscal year 1978 budget was submitted. Funds for the computer portion of the upgrade were included in the fiscal year 1978 budget. After approval of the radar resolution modification, it was determined that additional fiscal year 1978 funds would be required for systems engineering that must be completed prior to the fiscal year 1979 upgrade. It was then too late for requesting new authorizations for these additional fiscal year 1978 funds. Therefore, it was decided to handle this added $1 million increment as an unfunded requirement for fiscal year 1978. The supplemental fiscal year 1978 budget request provided the opportunity to update the fiscal year 1978 budget without impacting other programs.

Question. What effect will there be on the BMEWS program if this $1 million were not funded in this amendment?

Answer. The radar resolution portion of the BMEWS upgrade will be delayed resulting in increased cost and delayed operational capability. Additional risk will also be imposed on the computer replacement portion of the upgrade. The USAF would opt to return to funding this $1 million through the unfunded requirements process, although the impact on other priority programs must be fully assessed.

Question. What improvement in capability will this funding provide in fiscal year 1978 and why is it essential to have the improvement in fiscal year 1978?

Answer. It is essential to have RDT&E funds in fiscal year 1978 to insure radar resolution system design has progressed sufficiently to insure proper computer sizing prior to spending fiscal year 1978 procurement funds for new computers. Replacement computers are already programmed for reliability/maintainability reasons.

Question. How much additional funding will be required above the $10 million requested to make the planned improvement to the PAR program?

Answer. The current, best estimate for this software modification is $10 million.

Question. Why wasn't this funding requested in the initial fiscal year 1978 budget request?

Answer. Funding was requested in the fiscal year 1978 Budget Amendment and not the original fiscal year 1978 request because the proposed upgrade modification had not yet been defined during the DOD fiscal year 1978 Budget formulation cycle.

The utility of the proposed modification and of the PAR in general were subjects of a Secretary of the Air Force sponsored Warning Study presently nearing completion. Results of this total warning system review now reveal that PAR could play a vital role in the attack characterization mission if this modification is implemented.

Question. Has the Air Force conducted any studies on warning systems that indicate a requirement for this PAR effort?

Answer. Yes, a study is near completion now which justifies such a requirement.

Question. How does the decision to terminate the B–1 program relate to the decision to request funds for this PAR effort?

Answer. Without the B–1, survivability of the remaining TRIAD is much more critical. Survivability can be significantly enhanced by improved attack characterization information for NCA decision making.

Question. What would be the effect if the $10 million in funding for this PAR effort were deferred from this year?

Answer. Improvements in tactical warning and attack characterization resulting from this modification would be delayed at least a year. Costs for the tasks would increase due to a break in contractor support currently under US Army contract.

Question. Why wasn't the effort planned with this amended budget request included in the initial fiscal year 1978 budget request?

Answer. The effort was planned, but at a less sophisticated level due to limited resources. This amendment will permit more thorough development of details that would otherwise have to be assumed.

Question. What would be the effect if this effort were deferred until the fiscal year 1979 program effort?

Answer. Later development efforts will be at higher risk and operational dates for software would slip about six months.

Question. How does the B–1 program decision relate to the need to accelerate this warning information correlation program in fiscal year 1978?

Answer. It's not in acceleration, but a much better and more complete job. The Warning Information Correlation software will be essentially an aid to interpreting warning system data. Strategic force effectiveness will be enhanced to the extent that NCA decisions can be made more quickly and with higher confidence.

Question. The Air Force has indicated that this funding would accelerate certain technology and system integration of the B–52 by one year. Could this same period of acceleration be achieved by funding this additional request in the next fiscal year?

Answer. The technology and integration tasks are currently planned as fiscal year 1979 activities. Our acceleration statement was based on shifting the emphasis on these activities from fiscal year 1979 to fiscal year 1978. Application of additional fiscal year 1979 funds over those currently planned could accelerate the work somewhat, but the developmental nature of the activities limits the amount of additional funding that can be reasonably absorbed over a short time. The same period of acceleration could not, therefore, be achieved by funding this additional request in fiscal year 1979.

Question. Why is it significantly important to fund this acceleration of electro optic warfare programs in this budget amendment when much of the new mission requirements of the B–52 force without the B–1 aircraft will not be effective until later years?

Answer. The need to accelerate this work is not based on new mission requirements, it is based on the fact that the [deleted]. It is signficantly important to speed the development of countermeasures against both current and future mission threats.

Question. Does the Air Force plan to utilize the defensive avionics system being developed for the B–1 aircraft on the B–52 aircraft? If not, please explain.

Answer. No. The Air Force does not plan to replace the B–52 systems in total with the B–1 Radio-Frequency Surveillance/Electronic Countermeasures Set (RFS/ECMS) for several reasons:

The B–1 RFS/ECMS is a developmental defensive avionics system designed specifically to meet the B–1 defensive requirements. As an integral part of the total B–1 weapon system development, the RFS/ECMS design is greatly influenced by such specific B–1 parameters as radar cross-section values, electrical power and cooling capacity, integrated total aircraft systems data processing capability, physical size and space considerations, and anticipated aircraft performance (speed, altitude).

The effect of aircraft radar cross section on defensive avionics design is manifested in the effective radiated power (ERP) required for the system to effectively screen the aircraft radar return (or to present effective deception techniques) on the illuminating radar. Since the B–1 and B–52 have vastly different radar cross section values, the ERP requirements for effective counter-

measures are correspondingly different. ERP requirements are a fundamental factor in countermeasuers system design, from which specifications for basic transmitter output power, system and line losses, and antenna gain are derived. B–1 system specifications in these areas would have to be adapted for a potential B–52 application. Similarly, the integration aspects of B–1 RFS/ECMS application to the B–52, in a system transfer context, addressing the data processing, electrical, cooling, and electromagnetic interference/electromagnetic compatibility (EMI/EMC) requirements would require considerable study, analysis, and engineering development effort.

Without question, the basic technology improvements inherent in the B–1 RFS/ECMS development can and will be applied to future B–52 ECM upgrade efforts. Such a technology transfer has already occurred in one currently-programmed B–52 ECM improvement effort, The Electronically Steerable Antenna System (ESAS). The technical design baseline for the proposed B–52 ESAS is directly derived from the B–1 RFS/ECMS antenna development and supplied by the same contractor. Another planned B–52 defensive avionics improvement, the [deleted] tail warning system (TWS) is designed for application on a variety of aircraft, and was intended for direct adaptation to the B–1. Other current B–52 ECM improvement efforts, while oriented toward an incremental upgrade of existing equipment philosophy, recognize and benefit from the technological advances stimulated by the B–1 RFS/ECMS development. Such areas as software reprogrammability, jammer power management, and ECM technique generation have been addressed in current B–52 impovement efforts with some of the same technical approaches employed in the B–1. Because of the significant capital investment in existing B–52 ECM equipment and the technical growth potential of that equipment, a radical "remove-and-replace" approach to ECM improvement has heretofore been foregone for a methodical, progressive program of incremental capability enhancements. If and when the mission tasking for the B–52 and/or the nature of the threat it faces dictate a departure from this approach, the B–1 RES/ECMS certainly represents the baseline from which a "next-generation" B–52 ECM system would evolve.

Question. Will the defensive avionics capabilities of the B–52 aircraft through the mid-1980s be better or equal to the planned B–1 defensive avionics capabilities?

Answer. It is very difficult to make a direct comparison for projected defensive avionics capabilities for the two aircraft. The differences in aircraft size, radar cross section, and flight profile (penetration altitude and airspeed) place different defensive burdens on the aircraft. These differences are used to establish specific defensive avionics equipment specifications. Obviously each would be tailored to specific mission needs based on the physical characteristic of each aircraft. The defensive avionics capabilities intended for the B–1 are superior to the present defensive avionics in the B–52. Some of these can be used in the B–52 through the mid-80s. However installing the B–1 defensive avionics systems in the B–52 can not provide that aircraft with an equivalent penetration capability because of its larger size and slower airspeed.

Question. Has the Air Force determined if there is a requirement for improving the defensive avionics capabilities of the B–52 aircraft for purposes beyond the mid-eighties and could the B–1 defensive systems being developed satisfy this requirement?

Answer. As the Soviet radar and electrooptical threat continues to increase and evolve through the mid-eighties, it in turn necessitates improvements in B–52 defensive avionics to counter that threat.

In March 1977 the Strategic Air Command (SAC) was requested to conduct a comprehensive study and analysis of B–52 Electronic Countermeasures (ECM) capabilities and requirements for future penetration. A B–52 ECM requirements working group has been formed, and is working to establish a time-phased priority list of new Electronic Warfare (EW) systems or modifications required to optimize the B–52 D/G/A force effectiveness in contingency, nuclear stand-off, and nuclear penetration roles, through the 1988 time period.

The defensive systems equipment being developed for the B–1 can not be used on the B–52 without extensive major modifications to both the B–1 system and B–52 aircraft. The vast differences between B–1 and B–52 radar cross sections, mission profiles (speed and altitude), attendant complex systems integration problems, and the already significant investment in current effective B–52 ECM systems would appear to make a direct swapout neither practical nor cost

effective. However, the basic technology improvements inherent in the B–1 ECM system, can and will be considered and applied as appropriate in any future B–52 ECM update.

Question. What is the total program cost for any defensive avionics improvements that are needed for the B–52 to provide a penetrating bomber capability through the mid-eighties?

Answer. The B–52 defensive avionics update consists of [deleted] and adding steerable antennas and power management to the existing transmitters, improving the radar warning receivers and adding tail warning radar, improved [deleted] jamming capability, [deleted]. Total cost for these improvements is:

	Millions
Research and development	$141.3
Production	401.7
Total	543.0

Question. Why should any funding at all be authorized in this fiscal year 1978 budget until the cruise missile carrier concept studies for which funding is also being requested are completed and the Committee has an opportunity to understand how these carriers would be used?

Answer. The $90 million for the wide body cruise missile carrier aircraft program will be used to conduct a demonstration of the cruise missile carrier concept using existing aircraft. The program includes a system definition study phase and a flight demonstration phase which includes demonstration launches of the AGM–86B and AGM–109 missiles from a carrier selected in Phase I. The $2.5 million for advanced cruise missile carrier studies (strategic bomber enhancement) is for conceptual studies of a possible new aircraft which would be used to carry cruise missiles well into the 1990s.

Question. Why is it necessary to lease or buy wide body aircraft for demonstration launches at this time?

Answer. There are definite advantages to conducting an early demonstration launch of cruise missiles from a wide body aircraft. Such an effort provides a valuable R&D test and data base upon which an orderly system development can be established should this be required. A launch at this time also provides a highly visible demonstration of our interest and of the feasibility of such employment.

Question. Would it be practical and economical to hold a competitive minimal launch concept demonstration with two aircraft types selected from an initial open competition of all capable aircraft for this program?

Answer. It is not considered necessary to hold a competitive minimal launch concept demonstration with two aircraft types. The feasibility of launch and separation can be verified using a single wide bodied aircraft. A two aircraft, competitive program would substantially increase program costs.

Question. Why couldn't a minimal competitive launch concept demonstration using only 1–2 missiles be completed from between $20–30 million without the Committee committing to a program of $90 million even before a supporting study of how these aircraft would be used or what total program cost could be expected? This could be similar to the recent launch concept for launching the Minuteman missile for the C–5 aircraft.

Answer. The proposed cruise missile carrier program offers the advantages of an expedited clean competition between contractors and refinement of the cruise missile carrier design concept. Additionally, plans are being prepared to provide an early demonstration launch of our AGM–109 from a C–5 if a quick reaction demonstration is desired. This demonstration would verify the feasibility of separating the missiles from the aircraft. The cost of this early demonstration program has not yet been determined.

Question. Have any prospective cruise missile carrier contractors proposed launch demonstration concepts less costly than those planned by the Air Force for $90 million.

Answer. Yes. Contractors have prepared brochures describing launch demonstration programs for less than $90 million. For example, one program prices out at $41.5 million, but does not include necessary jettison test vehicles, live AGM–86Bs, Tomahawk missiles and related equipment. These programs do not include the System Definition Study Phase or the cruise missile design refinement included in the Air Force proposed program.

Question. If the TALC or ALCM–B program is to be accelerated for the Air Force, will the same management organization be used to control the program?

Answer. The current management structure with the Joint Cruise Missile Program Office under Captain W. M. Locke, USN, will be used to manage the development of the ALCM, the Navy Tomahawk systems, the Air Force Ground Launch Tomahawk system and TALCM.

Question. What costs and risks are involved in modifying the Tomahawk for use in the B–52 bomb bay?

Answer. The costs and risks involved in modifying the Tomahawk air vehicles for B–52 launch are considered to be minor. The basic Tomahawk missile design is considered mature. While the Tomahawk has had sufficient flight tests, it has never been mated to or flown from the B–52. This mating is believed to be straight forward engineering but requires a significant amount of testing and integration before all risks have been eliminated.

Question. Will both the ALCM and the TALCM be tested to demonstrate compliance with a common set of operational requirements?

Answer. Yes.

Question. Who will establish these requirements?

Answer. The Air Force as agreed upon by the Office of the Secretary of Defense.

Question. Will there be different requirements for each Service?

Answer. Both the ALCM and TALCM will be tested and evaluated for use by the Air Force.

Question. Will different requirements be established for the cruise missile which is to be launched from the B–52 than those requirements which are established for the cruise missile to be launched from the cruise missile carrier?

Answer. The operational scenario for the "cruise missile carrier" is still under study. The proposed cruise missile carrier studies will determine whether different requirements should be established.

Question. Is it desirable to have a common cruise missile for both the B–52 and the cruise missile carrier?

Answer. Yes. It is desirable to have common long range cruise missiles (AGM–86B or AGM–109) for the B–52 and the cruise missile carrier.

Question. Is it possible that we will find it desirable to procure two different cruise missiles, one for the bomber and one for the launcher?

Answer. This is not a likely outcome as long as we are looking only at the long range cruise missiles.

Question. Is there any reason why this supplemental authorization bill must be passed any earlier than October?

Answer. The proposed competitive flyoff would significantly redirect both the ALCM and Tomahawk programs. Failure to pass this supplemental authorization before the beginning of fiscal year 1978 forces the DOD to commence the new fiscal year without clear congressional approval to proceed with the desired development approach creating both consternation and confusion in both the DOD and the contractors. Further, delay in initiation of a competitive flyoff favors the contractors now under contract with the DOD to develop an air launched version of the cruise missile. Such a delay would, therefore, not only subject the Government to reduced benefits of competition but also subject the Government to an unnecessarily high degree of risk of a formal protest from contractors potentially disadvantaged by such a delay.

Question. Are there funds in the research for the cruise missile launcher which could be used for a B–2 bomber which would be a penetrating bomber?

Answer. Only the $2.5M for advanced cruise missile conceptual studies addresses other than existing aircraft.

Question. Is the C–5A being considered as a cruise missile launcher?

Answer. Yes.

Question. What other aircraft are being considered as cruise missile launchers?

Answer. Candidate wide body carriers include Lockheed C–5, Lockheed L–1011, Boeing 747, and McDonnell Douglas DC–10.

Question. What is the definition of the term "net assessment?"

Answer. Net assessment is not a specific technique or analytical tool. It is, rather, a method of analysis which is most generally characterized by a simultaneous focus on two or more opponents or competitors. Net assessment can be done for many purposes, and can be done at various levels within the Defense Department. Many assessments do not require specific methodological techniques but, rather, are forms of analysis which emphasize comparison and an even-handed look at both sides.

Question. What is regarded as the responsibility of the Intelligence Community in the preparation of, or in support of the preparation of, net assessments?

Answer. The Intelligence Community supports the preparation of net assessments by providing data and analyses on various military aspects of non-U.S. forces. In addition, the Intelligence Community, at times, prepares net assessments of the military capabilities of two or more non-U.S. forces, e.g., Arab-Israeli balance, North Korea-South Korea balance.

Question. What is regarded as the responsibility of consumers of intelligence in the preparation of, or in supoprt of the preparation of, net assessments?

Answer. In the preparation of net assessments, intelligence data is used along with data on U.S. forces for the purpose of conducting comparative analyses of strengths/weaknesses and military capabilities. These analyses can consist of static indices, dynamic analyses of hypothetical force interactions, and comparative analyses of overall combat readiness and effectiveness.

Question. What is the intelligence analysis and best judgment of the Soviet public, and, if different, private reaction to the cancellation of the B–1 and the acceleration of the air-launched cruise missile?

Answer. [Deleted] all signs are that the Soviets are a great deal more concerned over the cruise missile than what they feel they have gained by the B–1 cancellation. The Soviet atitude toward the B–1 has been relatively predictable. It represented just another step on the part of the U.S. to insure that the third arm of the TRIAD was maintained. While thousands of words were written which condemned it, it was not treated as a fundamentally new development. The cruise missile, on the other hand, has been described in numerous articles as a new dimension in the strategic balance.

[Deleted.]

Question. What modeling techniques, if any, were used in arriving at attrition rates in the Staff Study for the Secretary of Defense Modernization of the Strategic Bomber Force (hereinafter referred to as Staff Study), i.e., were individual U.S. weapons run against individual Soviet defenses or was an "exchange" model used?

Answer. Individual U.S. weapon systems were evaluated against individual Soviet defenses in detailed one-on-one models. The results were then introduced into a large simulation model to obtain the force attrition rates used in the Staff Study to determine the weapons arrival rates or force effectiveness.

Question. What is the basis for estimating the low-altitude surface-to-air missile (LASAM) probability of kill (Pk)?

Answer. This estimate is based on the demonstrated Pk's of current Soviet systems, air defense exercises of various kinds, and developments at the R&D ranges.

[Deleted.]

Question. What were the key pieces of evidence or data used in determining the attrition rates and Pk of various weapons in the key studies used in arriving at the B–1 decision?

Answer. There has been some dispute about weapons Pk's employed in these studies so I'll give you both sides of the argument.

The DoD technical community has used evidence pertaining to the technological characteristics of Soviet weapons to model one-on-one performance and calculate Pk's. These Pk's often tend to be on the order of [deleted].

DIA does not dispute these calculations but [deleted].

Question. What is the intelligence estimate of the likelihood of the denial to U.S. bombers of the eastern Mediterranean, the Sea of Japan, or both?

Answer. Although the Soviets have considerable potential in both areas we believe there is a very low likelihood that either could be denied to U.S. bombers on strategic strike missions. There is little reason to believe that Soviet air warning and control system (AWACS) aircraft could operate effectively over these areas because Soviet units would be extremely vulnerable.

Without AWACS the Soviets would be forced to rely on surface (land and sea) radars to detect the bombers. If the bombers flew at high altitude the Soviets would be able to conduct surveillance over most of the Sea of Japan. If the bombers were at low altitude (say 200 ft.), however, Soviet surveillance would be limited to about 40 miles from the coast plus whatever ships at sea could provide. The eastern Mediterranean would present even greater difficulties because the Soviets would be dependent on sea based radars or radars set up in countries around the coast. This would mean, at a minimum, that the defenses would be conducted within a heavily contested area. Considering the difficulties

involved, the likelihood that the Soviets could deny the eastern Mediterranean to bomber penetration is remote.

Question. What are the disagreements within the Intelligence Community about the meaning of specific pieces of evidence about Soviet Air defense capabilities?

Answer. Please understand that there is pretty general agreement within the Intelligence Community about the capabilities of Soviet air defenses. As you might expect disagreements arise in direct proportion to the ambiguity of the evidence. Let me mention a few specific and important areas:

[Deleted.]

What is most important, however, is not the somewhat detailed technical arguments, such as those cited, but rather the fact that virtually the entire Intelligence Community is in general agreement regarding Soviet air defense capabilities over the next ten years. The one exception is the U.S. Air Force which tends to give [deleted].

Question. The so-called "B" Team apparently differed with the Intelligence Community's national estimate of the netting capabilities of Soviet Air Defense.

(*a*) What, specifically, was the "B" Team's assessment of the Soviet netting capability?

(*b*) What evidence did that disagreement focus most sharply on based on specific information available to the analysts?

Answer. Let me quote the operative passages from the "B" Team report on this subject:

[Deleted.]

Question. What are the new technologies that the Soviets need for the SUAWACS?

Answer. The Soviets have the "technologies" required to improve and update the capabilities of the SUAWACS. By "technologies" we mean the basic understanding of processes needed to build the sophisticated, miniaturized, special components required to implement an improved SUAWACS. The Soviets major stumbling block appears to be the conversion of this technological base into production. The availability of reliable and sophisticated integrated circuits is vital to a project such as this.

[Deleted.]

There is little doubt that, with a high priority, the Soviets could develop the needed production capabilities in the future. Currently we estimate they could do this in the [deleted].

Question. What technologies do the Soviets not now possess?

Answer. Using the definition of technologies given in question 83, the Soviets possess all that are required. We do not believe however, that the Soviets will have the capability to produce the sophisticated components required before the [deleted].

Question. (a) What is the estimated SUAWACS capability to track, over land and over water, in 1982 and in 1985, the following—

(i) A cruise missile?

(ii) A penetrating bomber?

(iii) A standoff, cruise missile carrier?

(*b*) What are the uncertainties in the estimates?

(*c*) How was this estimate arrived at, i.e., what key indicator are now seen by analysts?

(*d*) What key indicators of this capability although not now seen, if seen, would be viewed as milestones and suggest a change in this estimate?

Answer. In our most offense conservative-estimates we anticipate [deleted].

Question:

(*a*) What is the estimated Soviet capability in 1982 and in 1985 to detect and vector interceptors to cruise missiles?

(*b*) What are the uncertainties in this estimate?

(*c*) How was this estimate arrived at, i.e., what key indicators are now seen by analysts?

(*d*) What key indicators of this capability, although not now seen, if seen, would be viewed as milestones and suggest a change in this estimate?

Answer. Two critical functions must be performed for successful intercept of a target: the vectoring function by ground-based (GCI) or airborne controller and the search/lock-on function by the interceptor after it receives vectoring support. [Deleted.]

We have high confidence in the estimate. [Deleted.]

Question:

(*a*) What is the estimated Soviet capability in 1982 and 1985 to detect low [deleted] radar cross section cruise missiles?

(*b*) What are the uncertainties in this estimate?

(c) How was this estimate arrived at, i.e., what indicators are now seen by analysts?

(*d*) What key indicators of this capability, although not now seen, if seen, would be viewed as milestones and suggest a change in this estimate?

Answer. There is relatively little doubt that the Soviets could develop ground-based radars with the required capabilities, but [deleted]. For ground-based radars, therefore, the issue is the number of such radars required. The Soviets would require many thousands of new radars in order to achieve continuous coverage against low-altitude targets; [deleted].

Question. What is the specific basis for production rates of the new air defense weapons and systems expected to be deployed by the Soviets in 1985?

Answer. Production rates for new air defense missiles and systems are a function of three factors:

(1) The number of missiles which are expected to be expended for research and development and for troop training.

(2) Those missiles and system components which are necessary to meet deployment requirements.

(3) A small percentage of missiles and equipment (usually about 15%) which are spares or are in supply channels.

Question. What specific information supports the DIA and other intelligence agencies' estimates of technological engineering, and production limitations that does not grant the Soviets the capability [deleted].

Answer. [Deleted.]

Question. How was the particular production or deployment rate calculated?

Answer. The deployment rate of [deleted].

Question. On what specific occasions have PVO Strany been unwilling to make the necessary heavy investments to counter an expected offensive threat?

Answer. We cannot say that there are any occasions when the Soviets have been "unwilling" to make heavy investments to counter a threat. We can say, however, that there have been occasions when they have at least held off investing in systems that couldn't work. The ABM and, even possibly, the SUAWACS, are cases in point. We believe one of the primary reasons the Soviets were willing to agree to ABM limits was their lack of success in solving the very complex problems which such systems present. This, of course, does not mean that if there were reasonable chance for success, that heavy investments alone would stop them doing whatever was necessary to insure success.

Question. Dr. Perry stated in his testimony that there are three defenses the Soviets might undertake in reaction to the cruise missile, viz massive deployment of the [deleted] deployment of an AWACS, and an advanced interceptor with a high quality look-down/shoot-down radar missile. He further stated that: "Each one of those three that I described to you would have an economic investment cost comparable to our B–1 decision. I can't give you exact dollars on it. . . ."

(*a*) Who provided the data to support Dr. Perry's statement?

(*b*) What were the assumptions as to numbers for each of these Soviet reactive defenses being equivalent in cost ot the B–1?

(*c*) What was the assumption as to cost of the B–1?

(*d*) What is the evidence that was used by DIA or Dr. Perry in making the calculations for the investment cost to the Soviets being equivalent to the cost of the B–1?

Answer. Data regarding the numbers of defensive components the Soviets would require were provided by DIA. The actual ruble cost to the Soviets has not been estimated precisely; rather estimated costs of comparable U.S. equipment were used. The U.S. equipment used for comparison purposes were the Improved Hawk, AWACS, and F–14.

[Deleted.]

All of the aforementioned DIA estimates are based on the coverage the Soviets would need and the assumption that the Soviets could develop equipment as good as current U.S. equivalents. The comment was not intended to indicate that the Soviets would or would not take these actions, but to indicate roughly the nature of the investment involved if they did.

Question. Is it expected that the Soviets will not have to increase electronic design requirements for the [deleted] now that the B–1 with its advanced ECM is not anticipated?

Answer. [Deleted.]

Question. Is a launch before lock-on capability attributed to the [deleted].

Answer. [Deleted.]

Question. What is the range of the longest-range Soviet interceptor?

Answer. The following table shows our current estimates of the combat radii of Soviet interceptors.

[Deleted.] It should be noted that radii vary greatly with load and mission profile.

Question. Could the BACKFIRE bomber be deployed as a long range interceptor?

Answer. Theoretically the BACKFIRE could be converted into a long range interceptor. [Deleted.]

We cannot predict how successful conversion of the BACKFIRE might be. Certainly from the stand-points of range and carrying capacity BACKFIRE looks quite attractive. The practical aspects of making the conversion—avionics, electronic warfare suits, radars, etc.—may make it a less attractive proposition than it appears on the surface. [Deleted.]

Question. Is there any truth to press reports late last month that the production rate of the BACKFIRE bomber has doubled?

Answer. [Deleted.]

Question. What is the present production rate?

Answer. The present BACKFIRE production rate is estimated to be between [deleted] aircraft monthly.

Question. How many BACKFIRE bombers do you believe the Soviet Union will produce?

Answer. It is presently estimated that [deleted].

Question. Have either of these estimates changed in the last year?

Answer. [Deleted.]

Question. What is the present range of the BACKFIRE bomber?

Answer. DIA assesses the range of the BACKFIRE to be [deleted].

Question. Is the BACKFIRE bomber presently deployed armed with cruise missiles?

Answer. [Deleted.]

Question. In its role with Soviet Naval Aviation, what kind of surveillance capability does the BACKFIRE bomber have?

Answer. [Deleted.]

Question. Could it (BACKFIRE) be used to enhance the Soviet defense against standoff cruise missile carriers?

Answer. The BACKFIRE could, without modification, be used to attack surface (sea or land) cruise missile carriers if the carriers have been located by a suitable target acquisition means. In order to attack a B–52 or other type of airborne carrier, the BACKFIRE would have to be modified to give it the characteristics of a long-range interceptor. This was discussed in the answer to question 96.

Question. What are the possibilities that the B–52, the wide-body jet, and even the cruise missiles themselves might become vulnerable to detection from sea-based or satellite-based surveillance systems?

Answer. Cruise missiles and their carriers could be detected today by many of the radars used on Soviet naval vessels. Range is the critical factor. [Deleted.]

Question. What are the expected Soviet responses to the pure Cruise Missile Carrier Aircraft in a pre-launch mode in the post-mid-1980's?

Answer. [Deleted.]

Question. What, if anything, is it expected that the Soviets might do to extend the high altitude GCI radar detection line by the mid-1980s?

Answer. As I mentioned we expect that air surveillance and control will be extended through the development and deployment [deleted].

Question. How far off the coast of the Soviet Union could the Soviet MOSS early-warning aircraft operate?

Answer. From the standpoint of range capability, the MOSS could operate well over a [deleted] miles from the coast. And with tanker support it could stay on station for as long as the crew could function. However, practical aspects of the defensive problem limit the distance that MOSS in exercises has, and in wartime, would operate [deleted].

Question. Over land and over water, at what range can the MOSS detect a high-flying B–52, Boeing 747, DC–10, B–1 and the cruise missile?

Answer. In the absence of offensive ECM, the MOSS could detect all except the cruise missile at ranges between [deleted] nautical miles. The cruise missile would not be flying at high altitudes but, if they did they might be detected at about [deleted] nm. ECM, if available, could change the picture considerably. Detention and tracking ranges probably would be severely degraded against all of these targets.

Question. Over-land and over-water, at what ranges can the MOSS detect a low-flying B–52, Boeing 747, DC–10, B–1 and cruise missile?

Answer. [Deleted.]

Question. In light of Soviet capabilities, what specific increases in pre-launch survivability will the request for tactical warning/attack assessment improvements give?

Answer. The warning/attack assessment improvements will provide higher confirmation of attack and refine the advance warning [deleted] if confirmation is required before launch of the bomber force, the improved assessment capabilities will provide this confirmation over a greater range of trajectories. This will result in greater confidence in pre-launch survivability.

Question. Has an "exchange" model analysis ever been run against an all-stand-off cruise missile carrier force?

Answer. An "exchange" analysis was conducted as a part of a staff study which involved an all standoff cruise missile carrier force against a representative target set, following a Soviet attack on U.S. forces.

Question. In the Calspan Study, it was noted that "the postulated look-down shoot-down (LDSD) interceptor could pose a serious threat to the SLCM. The AI would have little trouble tracking the cruise missile within [deleted] in the tail aspect at altitudes between [deleted]." What are the essential differences and similarities between the Calspan Study's observations about the SLCM and the Staff Study in regard to the threat against the inflight-air-launched cruise missile?

Answer. Within the same altitude regime, the capabilities given to the LDSD interceptors in the Staff Study are considered to be the same as used in the Calspan Study. However, the LDSD capabilities at the very low cruise missile altitudes in the Staff Study were less than the cited Calspan Study's medium altitude capabilities. The Staff Study credited the Soviet LDSD with mirror image U.S. technology against low flying cruise missile sized targets.

Question. Has the interceptor threat changed since the Calspan Study?

Answer. No, there has been no change to the interceptor threat since the Calspan Study.

Question. Has the moderate reduction in the tail-on RCS been made so as to accept the Calspan study conclusion that this reduction would eliminate the look-down, shoot-down intercepter as a threat? If so, what was the extent of the reduction of the tail on RCS, if not, why not?

Answer. One of the Calspan study conclusions was that a moderate reduction in the tail-on RCS would eliminate the look-down/shoot-down interceptor as a threat. At that point in time the RCS had not been measured on an operational cruise missile and the study assumed a tail-on RCS of [deleted] square meters. The moderate reduction referred to in the Calspan report was considered to be in the order of [deleted] reduction or tail-on RCS of about [deleted] square meters. During the competitive phase of the Tomahawk development, the RCS of both the LTV and General Dynamics missiles was measured at the RATSCAT facility, Holloman AFB, New Mexico. These measurements were done with production type missiles as opposed to earlier measurements with full scale models. The results of these measurements for the General Dynamics were:

Frequency (GHZ) RCS (square meters) $\pm$ 60° of tail-on [deleted].

As a result of the Calspan study conclusions, additional reduction efforts were instituted after the contract award to General Dynamics. Diagnostic testing during July and August 1976 at Holloman AFB showed that several changes such as the use of RAM in the engine tailpipe could reduce the tail-on RCS. The results of these tests were:

Frequency (GHZ) RCS ($M^2 \pm 60°$ of tail-on [deleted].

This reduction is considered to be the reduction required to satisfy the Calspan concern over the LDSD threat.

Question. The Staff Study notes that cruise missile target coverage varies depending upon range limit of the cruise missile, whether the cruise missiles are launched from B–52's and cruise missile carriers at [deleted] whether cruise missiles are launched from B–52's and cruise missile carriers (CMC) [deleted]

NM from inceptor bases, and whether certain territory is denied. Does the percentage of coverage of targets pertain to the specific target base used in the SIOP?

Answer. The percentage of target coverage does not reflect the specific base used in the SIOP, but is representative of that base.

Question. What number of superhard (2,000 psi) and hard (150–2,000 psi) targets does the cruise missile target coverage percentages reflect?

Answer. From standoff launch points [deleted] about [deleted] of the target base is within cruise missile reach. This portion of the target base contains about [deleted] of all the superhard (greater than 2,000 psi) targets and about [deleted] of all the hard (150–2,000 psi) targets.

Question. What is the assumed number of B–52's used in the calculation? What is the assumed number of CMC used in the calculation?

Answer. The number of B–52's and CMC's is not relevant to this calculation since the issue is the percentage of targets which could not be reached by cruise missiles because of range limitations. Target coverage is solely a function of cruise missile range from launch point to DGZ.

Question. What is the percentage of target coverage if B–52's without CMC launch cruise missiles [deleted]?

Answer. Cruise missiles launched by standoff B–52's [deleted] could reach about [deleted] of the target base.

Question. What is the percentage of target coverage if CMC's without B–52's launch cruise missiles [deleted]?

Answer. Cruise missiles launched from CMC's [deleted] could place the same percentage of targets at risk (about [deleted] as [deleted].

Question. What is the percentage of target coverage if B–52's without CMC, launch cruise missiles 800 NM from interceptor bases?

Answer. Cruise missiles launched by standoff B–52's at 800 NM from interceptor bases could reach about [deleted] of the target base.

Question. What is the percentage of target coverage if CMC, without B–52, launch cruise missiles 800 NM from interceptor bases?

Answer. Cruise missiles launched by standoff B–52's at 800 NM from interceptor bases would have the same percentage of targets in reach about [deleted] as B–52 missiles launched at the same point.

Question. What is the significance in the staff study of "CMC only" as an assumption in calculating [deleted] target coverage if cruise missiles are launched 800 NM from interceptor bases and the eastern Mediterranean and the Sea of Japan or both are denied?

Answer. If access to launch points in these areas is denied, target coverage is reduced to about [deleted].

Question. Did the Interagency Intelligence Memorandum that reviewed prospects for improvements in Soviet low altitude air defense explicitly study the deficiencies in Soviet defenses against the low [deleted] radar cross section cruise missiles? If studied in the IIM, what were the conclusions.

Answer. The Interagency Intelligence Memorandum did not address Soviet defenses against cruise missiles.

Question. Did National Intelligence Estimate 11⅜ come to any conclusions about the capability of Soviet low altitude air defense against the low [deleted] radar cross section cruise missiles? What, if any, were these conclusions?

Answer. NIE 11–⅜–76 did address the Soviets capability to defend against low radar cross section cruise missiles. [Deleted].

Question. If neither of these assessments studied the Soviet low altitude air defenses against the low [deleted] radar cross section cruise missile, what specific intelligence assessments formed the basis for the assessment of the Staff Study?

Answer. [Deleted.]

Question. What, if any, new research or intelligence assessment was required for, performed by or prepared for the participants in the Staff Study?

Answer. Participants in the Staff Study used many existing threat analyses and estimates as inputs and, with few exceptions, these were considered adequate for the Staff Study. Some analyses were redone or rechecked for their validity, including: radar, GCI and SAM coverage and interceptor deployment. Addition-

ally, a study was performed to determine potential Soviet SAM deployment strategies for protection of military, industrial and population targets.

Question. If such new research or intelligence assessment was done, what were the conclusions and how were they arrived at?

Answer. As stated in the answer to question 118 no substantive new research or intelligence estimate was done for this study.

Question. What, if any, reduction in the time a mission can be recalled will there be with a B–52 armed with a long range ALCM compared to a B–1 (compared to the current B–52)? A Cruise Missile Carrier compared to a B–1 (compared to the current B–52)?

Answer. Any bomber can be recalled at anytime [deleted]. The primary difference is that when the ALCM leaves the platform it cannot be recalled so you essentially have the flight time differential between that ALCM launched from a standoff position compared to the penetration time to the target.

Question: Given constant assumptions regarding alert rates and the threat, what is the pre-launch survivability of the current B–52, the B–1, the B–52 armed with long range ALCMs, and the Cruise Missile Carrier?

Answer. At this point in the design phase, there appears to be no reason to expect significant differences in the pre-launch survivability characteristics of the current B–52 and the B–52 armed with the long range ALCM. The alert rates for the aircraft do differ considerably. The current B–52 presently has a sustained alert rate capability of approximately [deleted] while the B–52 CMC alert rate, due to less strenuous crew training requirements, is estimated at [deleted]. The B–I had a design capability of [deleted] as do the CMC candidates. Under conditions of relaxed tensions a likely SLBM threat would consist of [deleted] SSBNs [deleted] offshore. Nearly all alert B–1, B–52, and CMC would be expected to survive an attack by such forces.

As the threat increases, the survivability of the alert bomber force would decrease. An attack from [deleted] SSBNs, [deleted] offshore, with the SLBMs flying a [deleted] trajectory, would reduce survivability to about [deleted] of the alert B–52 and CMC aircraft. [Deleted] B–1 aircraft would have been expected to survive.

Question. Compare the cost of maintaining on alert additional 10 percent increments of the total bomber force composed of the following kinds of system: Current B–52; B–1; B–52 armed with long range ALCMs; Cruise Missile Carrier.

Answer. Generally, the day-to-day alert rates of the strategic bomber force are limited by their designed maintenance supportability. The O&S cost data available for the specific future bombers are limited to their design alert rates while the current B–52 does have variable cost for its present and design limit alert rate. Table 1 lists the approximate cost data in millions 1977 dollars.

TABLE 1.—ANNUAL O. & S. COSTS

[In millions of dollars]

A/C	UE	Alert rate (percent)			
		30	40	50	60
[Deleted.]					

Question. How many and what percentage of the current SIOP weapons on aircraft are currently assigned to suppress defenses? How would these figures change in the mixed force postulated by General Slay which would be composed of penetrating B–52s and B–52 with long range ALCM's?

Answer. The SIOP relies on mutual support therefore the specific defense suppression contribution of one leg of the TRIAD varies with the revisions. However, if the bomber had to, it could deliver all the weapons required to insure bomber penetration. In the current revision approximately [deleted] percent of the total number of bomber weapons are allocated to essential defenses. As the SIOP forces and enemy situation change, so will the composition of the defense suppression package. In the postulated force, the percentage of penetrating bomber weapons used for SAM suppression should increase to about [deleted] of penetrating bomber weapons. This results from [deleted] projected in the mid-

1980s. Every weapon used in a defensive role subtracts from weapons available to be used against defended objective targets.

Question. How many and what percentage of the long range ALCMs in that postulated mixed force will depend on defense suppression by SRAMs carried by the penetrating B–52s.

Answer. [Deleted.]

Question. What, if any, difficulties will face our SIOP planners in coordinating the long range ALCMs being launched at the periphery of the Soviet Union with a SRAM that is being launched by a penetrating bomber near the target?

Answer. The main complexity would be [deleted].

Question. Will a SIOP using the postulated mixed force be more or less difficult to coordinate than the current one using penetrating B–52s? Than one using penetrating B–1s and B–52s?

Answer. Any future force would be more difficult to coordinate just because of the larger numbers of weapons and cruise missile delivery vehicles involved. The planning complexity and probability of interaction increase with the greater requirement for weapons. Also, due to the inflexibility in target selection after a cruise missile is loaded, the planning task will be more difficult than with Bombers carrying SRAM and free fall bombs which the crew can retarget, if directed. Each cruise missile has to have specific maps and specific routes, turn points, fix update areas, etc., as well as a specific target assigned before the missile is loaded on the bomber.

Question. Will a SIOP depending on a postulated mixed force have substantially more or less uncertainties because of the need to coordinate stand off weapons launched than the current one which used penetrating B–52s? Than one which would use penetrating B–1s and B–52s?

Answer. Anytime the results of a weapon which has been applied against a target cannot be directly observed, there is some degree of uncertainty. The uncertainty is bounded by operational tests, experience levels of proficiency, results of live tests, etc. The ratio of targets to weapons also provides for some level of uncertainty. Assuming that a postulated cruise missile carrier performs as planned and the cruise missile technology can be fully exploited, then the uncertainty can be reduced.

Question. In the current SIOP what percentage of our penetrating bombers would need to engage undegraded air defenses if our SLBM and ICBMs were not used to suppress these defenses?

Answer. If SLBMs and ICBMs were not used for defense suppression [deleted] SAC with JSTPS would have to "remate" the bomber and tanker force. Some additional bomber weapons would be programmed for defense suppression and most likely they would reallocate some weapon/target assignments. In short, the bomber is capable of providing all essential defense suppression; however, that may not represent the most efficient application of weapons.

Question. Will the long range ALCM in the postulated mixed force depend more heavily on defense suppression by SLBMs or ICBMs than current bomber weapons do? Than the B–1 would have?

Answer. [Deleted.]

Question. If the long range ALCM in the postulated mixed force will be more dependent on defense suppression by ICBMs than the current bomber force, and if our ICBMs become in substantial jeopardy from the Soviet ICBMs, what alternatives will we have to mainain the balance of the TRIAD?

Answer. [Deleted.]

Question. Do you expect to maintain penetrating bombers as an important portion of mixed force through the 1980s; or do you expect by 1990 to rely totally on stand off Cruise Missiles?

Answer. Because of the unique qualities inherent in the penetrating bomber it will be a part of the mixed force for the foreseeable future. While penetration of the defenses will most likely bring new challenges, similar improvements will also occur in manned-aircraft penetrator technology.

Question. What synergistic advantages are gained from a mixed force? (Please be complete and specific as possible.)

Answer. [Deleted.]

Question. If by the late 1980s we are relying on the stand off cruise missile forces rather than a mixed force which of the synergistic advantages will be lost and what compensation do you plan for these losses?

Answer. [Deleted.]

Question. What is the demonstrated radar cross section of the AGM–86? What reductions in its RCS do you believe possible?

Answer. The radar cross section (RCS) of the AGM–86 has been measured at [deleted]. On-going research indicated the possibility of further RCS reduction through the use of [deleted]. These techniques may have potential for developing AGM–86 and AGM–109 missiles. I believe that technology may permit [deleted] RCS reduction for future generation cruise missiles.

Question. What is the coordinated intelligence estimate regarding Soviet capability to home on bomber ECM in the mid-1980s? If there is none, what is the best estimate of the Department of Defense?

Answer. [Deleted.]

Question. What is the intelligence community's estimate of the [deleted] capability to defeat the AGM–86 and AGM–109? If there is none, what is the best estimate of the DoD?

Answer. [Deleted.]

Question. What is the Department of Defense's best estimate regarding the percent of the penetration portion of the current B–52 missions in which the terrain masks the B–52 from enemy radar? How will this change in the mid-1980s?

Answer. Each bomber sortie is planned so as to avoid exposure to radars as much as possible. In the mission planning, terrain masking is considered in the determination of avoidance distance. Since the masking effects of terrain are a function of bomber altitude, direction of approach, and radar site positioning, the amount of mask is peculiar to each site. Thus, there is no single value for terrain masking which could be stated.

Question. Please provide a map which shows the coverage of current GCI sites comparable to the maps used by Mr. Hughes in his testimony. Please provide a second map reflecting the intelligence community's best estimate of how this coverage would be extended by the mid-1980s.

Answer. The attached maps [maps deleted] show the general coverages at three different penetration altitudes before the effects of terrain and site masking are considered. Thus they represent an offense conservative picture.

Figures 1 through 3 show the coverage which presently known GCI sites could provide against targets at 200, 1000 and 40,000 feet respectively. [Deleted.]

Figures 4 and 5 show the potential GCI coverage in the mid-1980s if the Soviets decide to greatly expand the GCI network. These figures are based on the assumption that every ground radar site will be able to conduct GCI. [Deleted.]

Question. What would be the effect against the Soviet population and installations if they used nuclear armed SAMs as part of their air defense?

Answer. [Deleted.]

Question. How much would such a nuclear armed SAM increase the effectiveness of the Soviet air defense against penetrating B–52s? Against cruise missiles?

Question. How many of the [deleted] Floggers produced each year are of [deleted].

Answer. [Deleted.]

Question. What is the intelligence community's best estimate regarding the number, quality, and net effectiveness of mobile SAMs as an element of Soviet air defenses against penetrating B–52s in the mid-1980s? Against cruise missiles in the 1980s? If the intelligence community has no estimate of the net effectiveness of mobile SAMs, what is the best estimate of the DoD?

Answer. Mobile SAMs are most effective against penetrating bombers because they degrade the bomber's capability to avoid SAM defenses. [Deleted.]

Cruise missiles depend on their low radar cross section and low altitude (100 ft. to 200 ft.) flight to insure penetration. [Deleted.]

Question. Over one-half of our EMT is currently carried on bombers. Will this proportion be reduced by the postulated mixed force? If so, what, if any, military effectiveness would be diminished as a result? Is this significant enough to require compensation from another leg of the TRIAD?

Answer. The postulated force mix of penetrating bombers and B–52s carrying cruise missiles [deleted] of total EMT currently carried by the bomber force. Today that percentage is [deleted] In 1986, with the postulated B–52 cruise missile carrying force, the percentage is [deleted]

Question. What number and percentage of weapons in the current SIOP on aircraft are gravity bombs?

Answer. [Deleted] percent of the aircraft weapons in the SIOP are gravity bombs; this equates to [deleted] of the megatonnage delivered by the bomber leg of the TRIAD.

Question. How would this number and percentage change in the postulated mixed force?

Answer. The primary difference between the current force and the postulated force relative to gravity weapons is the number of B–52s which would no longer penetrate enemy territory. Each penetrating B–52 can carry up to [deleted] gravity weapons. For each B–52 assigned to a purely standoff role, it would be necessary to subtract the number of gravity weapons previously loaded. In the postulated force, up to [deleted] gravity weapons would be removed.

Question. How many targets in the current SIOP, if any, require the unique characteristics of gravity bombs? How will the number and percentage of this kind of targets change as the target base grows?

Answer. [Deleted.] As the target base changes not only in size but in character, more such judgments will be required.

Question. If the projected force will have fewer gravity bombs, will forces from another leg of the TRIAD need to be shifted to assure the same level of damage to targets currently assigned to gravity bombs?

Answer. The actual laydown of forces with the reduction of gravity bombs will be accomplished by JSTPS planners as cruise missile weapons become available. Our analysis indicates no loss of effectiveness will result as gravity bombs are removed from the force.

Question. In his testimony, General Slay used the example of a [deleted] gravity bomb targeted on a military depot. What would be the comparative probability of damage on the same target from a [deleted] cruise missile with projected TERCOM accuracies?

Answer. The probability of damage (PD) by a single nuclear weapon is dependent on the hardness of structures and the area of the target. For soft depots [deleted] the PD is approximately [deleted] for both the [deleted] weapons describe out to a depot radius of 2 nm. For greater radii, the PD of the [deleted] weapons drops off much more rapidly than that of the larger weapon. At 2 nm, the PD expected of the smaller weapon is [deleted] that expected of the larger. With 5 nm target radius, the figure decreases to [deleted.]

For hard targets [deleted] the PD of both weapons drops off much more rapidly as area radius increases. However, for radii between [deleted] nm, the PD expected from the [deleted] weapons is [deleted] that of the [deleted] weapon.

Question. General Slay stated in his testimony that some bomber weapons are used against the nuclear threat in a "look-shoot mode." How many of the weapons in the current SIOP on aircraft are assigned to that task?

Answer. [Deleted.]

Question. What percent of this class of targets is destroyed by these weapons? What percent of total expected damage to this class of targets would be produced by these weapons?

Answer. [Deleted.] Methodology has been developed to measure these probabilities, and future revisions to the SIOP will reflect the potential value of this tactic.

Question. How would the postulated mixed force change these figures? In terms of the definitive targeting guidance to the Department, from the President and the Secretary of Defense, how significant are these changes?

Answer. New significant changes to U.S. targeting policy have not been directed. It would be impossible to predict its impact until the strategy and nuclear weapons employment policy become available.

Question. How many additional weapons currently in the SIOP on aircraft are used in damage assessment strikes against other classes of targets? How would this be changed in the postulated mixed force?

Answer. [Deleted.] We cannot predict how this would change since it is a function of how JSTPS would plan any particular SIOP revision.

Question. What is the estimated weapons system reliability of:

a. A SRAM off the current B–52;
b. A gravity bomb off the current B–52;
c. A SRAM off the B–1;
d. A Gravity bomb off the B–1;
e. An ALCM–A off the current B–52;
f. AGM–86A off tthe B–1;
g. An AGM–86 off a B–52;
h. An AGM–109 off a B–52;
i. An AGM–86 off a Cruise Missile Carrier; and
j. An AGM–109 off a Cruise Missile Carrier.

Answer. The following are currently used estimates for weapon system reliability of:

a. SRAM off the current B–52;
b. Gravity Bomb off the current B–52;
c. SRAM off the B–1;
d. Gravity Bomb off the B–1;
e. ALCM–A off the current B–52;
f. AGM–86A o: the B–1;
g. AGM–86 A or B off a B–52;
h. AGM–109 off a B–52;
i. AGM–86B off a cruise missile carrier; and
j. AGM–109 off a cruise missile carrier.

} [Deleted.]

Question. How many and what percentage of bomber sorties currently in the SIOP incorporated demand assessment strikes? How would this be changed in the postulated mixed force? What compensating adjustments will be required?

Answer. [Deleted.] Once again since this is a function of how JSTPS plans a SIOP revision, we cannot postulated how this figure would change.

Question. How will the upgrade of the navigation systems of the B–52 Gs and Hs affect the weapons effectiveness of SRAMs and gravity bombs on a hard target? On a super-hard target?

Answer. The upgrade of the bombing navigation system (BNS) will increase the weapon effectiveness of SRAMs, gravity bombs, and cruise missiles on all types of targets. The function of the BNS is to determine aircraft location for navigation and to compute the release point for weapons. The system takes position, heading, airspeed, and target location to determine the solutions. The new BNS update will increase the accuracies of gravity releases, missile initialization data for launch, and aircraft location. These accuracies are inherent in the state of the art systems. Less accurate systems, though available, would substantially decrease effectiveness and reliability and increase support costs.

The following data illustrates the gains with the new system:

	Present system	B–52 avionics update
Bomb CEP PSI coverage (1.1 Mt/0.9 Pd) SRAM CEP PSI coverage (200 kt/0.9 Pd) Reliability Mean time between failure Amortization period Navigation drift rate Cruise missile prob—1st matrix	[Deleted]	

Note: [Deleted.]

Question. Please list by year through 1985 the weapons which would be available to the SIOP on aircraft by type of weapon and by aircraft: (1) if we had acquired and armed the B–1 as previously planned (2) in the postulated mixed force currently proposed.

Answer. Weapon loading associated with specific aircraft is mission dependent and therefore not addressed. Planned weapon availability, B–1 included, was as follows:

	Fiscal year—							
	1978	1979	1980	1981	1982	1983	1984	1985
[Deleted.]								

[Deleted.] The Air Force is currently altering strategic force structure in compliance with the President's B–1/Cruise Missile decision and total weapon mix requirements are yet to be finalized.

Question. General Slay postulated the use of 75 B–52Ds as standoff Cruise Missile Carriers as part of the mixed force in the 1980s. Please list the modifications to the B–52Ds required to deploy cruise missiles on them and the estimated unit and total cost?

Answer.

B–52D MODIFICATIONS REQUIRED (80 A/C/75 UE) TO DEPLOY CRUISE MISSILES

[Fiscal year 1977 dollars]

	R.D.T. & E.	Production
Offensive avionics	[1] $25.0M	$176.0M
External pylons	47.0M	56.0M
Wing beef up	1.0M	20.0M
Internal launcher	27.0M	50.0M
Group A	32.5M	38.0M
Electrical/hydraulic update	0 M	128.0M
Total	132.5M	468.0M
	600.5M	
Unit costs	1.7M	5.9M
	7.5M	

[1] Additional to modify new offensive avionics being designed for B–52G/H to be compatible with the B–52D. B–52G/H program is $106M in R.D.T. & E. The B–52G/H package would be required for B–52D to be Cruise missile carrier.

Question. To maintain [deleted] alert weapons, as General Slay postulated in the mixed force in the 1980s, how many more aircraft would have to be on alert than is now the case?

Answer. Alert rates are determined after consideration of many factors. If the number of aircraft weapons were the sole determinant, then a choice of aircraft would be necessary. For example, [deleted] aircraft weapons could be placed on alert through a combination of [deleted] aircraft armed with [deleted] ALCM each and [deleted] aircraft armed with [deleted] weapons each. Other weapon configurations would require different numbers of aircraft. Obviously, other combinations of aircraft can provide the required number of weapons. [Deleted.]

Question. If the same annual O & M cost required to maintain these [deleted] weapons on alert were used to maintain a B–1 force on alert, how many weapons would be on alert?

Answer. The Operations and Support cost of the postulated force, including aircraft and weapons is about $1.2 billion per year in 1977 dollars. The Operations and Support cost for the proposed force of 210 UE B–1s, again including only aircraft and weapons, was $540 million. This assumed an average load of eight SRAM and eight gravity weapons for the alert force. Assuming that enough B–1s and weapons were purchased to use the difference in Operations and Support funds and the B–1 force stood alert at a [deleted] rate, about [deleted] weapons could be placed on alert.

This hypothetical situation ignores the relative investment costs of the two forces.

Question. General Slay described a possible sortie by the B–52 carrying long range cruise missiles which would "top-off" its fuel [deleted]. How many of the bomber sorties currently in the SIOP [deleted].

Answer. [Deleted.]

Question. How many and what percentage of the sorties in the postulated mixed force of mid 1980's would require a second tanker?

Answer. If the entire force were exercised, [deleted] of the total bomber force [deleted] penetrating bombers and [deleted] standoff carriers—would require more than one tanker. Assuming an alert rate of [deleted] for penetrating bombers and [deleted] for standoff carriers, [deleted] of the bomber force [deleted] penetrators and [deleted] standoff carriers—would require more than one tanker provided that targeting and recovery procedures are similar to those used today.

Question. Would this require additional tankers? If so, at what cost?

Answer. No additional tankers will be require above the present inventory level for strategic force employment.

Question. Given the existing tanker force, can the postulated bomber force obtain as much target coverage as the existing bomber force? If not, how many additional tankers are required? At what cost?

Answer. Employing the existing tanker force, there would be no variance in target coverage between the current and postulated bomber force.

Question. General Slay testified on July 27: [Deleted.] Which if any, prospective Soviet system would degrade this advantage we currently enjoy?

When does the intelligence community estimate the Soviets will obtain this capability?

Answer. [Deleted.]

Question. What planned modification to the B–52 would counter these Soviet improvements?

Answer. [Deleted.]

Feasibility demonstrations of modifications to the B–52 ALR–20 ECM receiver to provide [deleted] have been conducted, and a preproduction engineering development effort will be initiated in FY 78. This effort, [deleted].

Question. On July 27 in his discussion of bomber ECM problems General Slay testified: "So it would not be a tremendous task even if we found we were not covering this particular radar to be able to develop in reasonable short order the capability to do so."

Dr. Perry testified that he agreed with this assessment.

Secretary Brown testified before the House Armed Services Committee on August 2: "I believe that coping with the Cruise Missile's tiny radar cross-section will be far more difficult for the Soviets than coping with the B–1's ECM—perhaps even by taking advantage of it—would have been."

What, if any, differences in judgments reflected in this testimony of these witnesses?

Answer. There is no difference in judgments reflected in the testimony of these witnesses. In the case of General Slay's testimony relative to bomber ECM, the point being made was that an advanced bomber ECM system would be designed, using digital software control of ECM techniques and for recognition of threat radar characteristics, which could be rapidly and easily changed to counter new enemy radars. Secretary Brown's comment relative to the B–1 ECM, which represents an advanced bomber ECM system as illustrated in General Slay's comment, refers to the dynamics of U.S. electronic warfare techniques. [Deleted.]

In the case of the Cruise Missile versus an advanced bomber ECM system, the situation for the Soviets is another matter. The problem created by a very small Cruise Missile radar cross section for a Soviet radar is a basic radar physics problem. The radar must contend with trying to track a small target through considerable terrain clutter.

Question. Is the Department's collective position that it has high confidence both in our bomber ECM and in our cruise missile penetratively even in the late 1980s?

Answer. We have high confidence in the ability of current and future cruise missiles to penetrate Soviet air defenses. Further, we plan to continue to use a portion of the bomber force as manned penetrators for an indefinite future period depending on the results of our continuing assessment of Bomber ECM effectiveness.

Question. Dr. Perry testified that he estimates the cruise missile accuracy to be [deleted] feet. Does that estimate include contributions to the total system error from the aircraft navigational system? If so, how much of the [deleted] feet is due to that factor? If not, how much additional error should be added to the [deleted] feet due to that factor?

Answer. Yes, values from aircraft system are included.

The carrier aircraft navigation system must have a high degree of accuracy to enable the cruise missile to accomplish its first position fix. The key to providing good initialization data for cruise missile launch after extended time overwater is the drift rate and platform accuracies of the inertial navigation system (INS) aboard the aircraft. [Deleted.] An INS which meets these requirements is included in navigation system. After launch initial values are torqued by TERCOM fixes and missile navigation system.

Question. In the postulated mixed force, what penalties would have to be paid if the B–52 carried weapons externally? What compensation would be required

to maintain a constant aggregate effectiveness from the aircraft portion of the Triad?

Answer. The penalties associated with the penetrating B–52s carrying external weapons in addition to the internal weapons load are increased drag and decreased fuel capacity due to inflight gross weight restrictions. These penalties impact adversely on range. Increased tanker support can only regain some of the lost range.

Question. How many penetrating B–52s in the postulated mixed force in the mid 1980s would carry weapons externally?

Answer. [Deleted.]

Question. How many would be limited to internally carried weapons?

Answer. If possible, [deleted] penetrating bombers will carry weapons internally to avoid range penalties.

Question. Of the penetrating B–52s which would use only internally carried weapons, how many would carry long range ALCMs internally?

Answer. [Deleted.]

Question. In this case what reduction in weapons loading would result compared to a penetrating B–52 with a fully loaded SRAM rack and internally loaded gravity bombs?

Answer. In the postulated force there were [deleted].

Question. What would be the aggregate weapons reduction of this class of weapon carriers?

Answer. [Deleted.]

Question. General Slay postulated approximately [deleted] weapons on aircraft to maintain the same level of effectiveness as the current bomber forces. How many weapons would have been required in the previously planned B–1 force to maintain the same level of effectiveness?

Answer. With the B–1 integrated into the strategic bomber force, the number of weapons would have been [deleted] weapons to maintain the same level of effectiveness. This is due principally to the [deleted] weapons in the B–1/B–52 force.

Question. General Slay testified that some of the weapons in the postulated mixed force of the mid 1980's would be used to saturate defenses. Please describe how that technique would work and how it would defeat air defenses.

Answer. Large numbers of penetrating vehicles confuse enemy defenses by increasing the mass of the penetrating force. For example, cruise missiles planned to arrive prior to or in conjunction with bombers draw defense reaction, therefore, decreasing the number of fighters and SAMs available to engage penetrating bombers and diluting their overall effectiveness. Weapons are not allocated solely for the saturation role but with pre-planned force timing this effect is generated.

Question. How many and what percentage of the postulated [deleted] weapons would be spent in the saturation of defenses instead of attacking dedicated targets?

Answer. [Deleted.] All weapons attacking objective targets add to the mass of penetrating vehicles; thereby, contributing to enemy defense saturation.

Question. Please provide the number and percentage of total weapons committed to defense suppression or saturation in the following three forces:

(*a*) The current bomber force.

(*b*) The previously planned force with B–1s in 1985.

(*c*) The postulated mixed force in 1985.

Answer. (a) [Deleted] of the bomber force weapons are defense suppression weapons. (b) About [deleted] of the total penetrating bomber weapons would have been used for SAM suppression in the previously planned B–1 force. Cruise missile operating with that force would have provided defense saturation by increasing total force mass. Cruise missile saturation is however a residual effect of targeting cruise missiles to [deleted] targets—they are not launched primarily for the saturation effect. (c) Although the absolute number of suppression SRAMs [deleted] as for the previously planned B–1 force. The cruise missiles operating with the postulated force would provide a level of defense saturation.

Question. What changes in the weapons required to maintain a constant level of effectiveness from the aircraft leg of the Triad with the postulated mixed force in the mid-1980s would be needed if the yield of the ALCM were [deleted] instead of [deleted]?

Answer. Against a [deleted] psi point target a [deleted]. The accuracy goals of the cruise missile programs are [deleted]. Testing accomplished to date favors

the [deleted] figure. Against a [deleted] psi area target a [deleted] decrease in lethal area coverage for the latter warhead.

This does not necessarily translate into a requirement for [deleted] in the number of weapons applied however. A more precise answer would require a complete SIOP laydown for each case.

Question. Dr. Perry testified that the ASALM could be used for defense suppression from a stand off aircraft. Since its projected range of [deleted] miles would still be [deleted] than the long range ALCM, how could the ASALM be used as a defense suppressor?

Answer. ASALM is being designed with an [deleted]. Such a capability could be used against possible Soviet deployment [deleted].

Question. How much R&D and Procurement funds would be required in FY 1978 to support the development of an ALCM–A with an IOC of [deleted]. What would be the total additional R&D and Procurement cost to support the acquisition of enough ALCM–As to be integrated with SRAMs internally in the [deleted] B–52s, Gs, and Hs in the postulated mixed force of the mind 1980s?

Answer. The feasibility of an AGM–86 A&B program with concurrent [deleted] limited IOCs is doubtful. However, the concurrent development of the A&B with a limited IOC for the AGM–86B of [deleted] and a limited IOC for the AGM–86A of [deleted] would require approximately $25M additional total R&D funds; approximately $11M in fiscal year 1978 and $14M in fiscal year 1979.

In the postulated mixed force, [deleted]. If AGM–86As were to be integrated into future forces, unit flyaway costs for the ALCM–A would be approximately 10 percent less than for the ALCM–B.

Question. What are the advantages and disadvantages of doing this? (Please be as specific and complete as possible.)

Answer. An internal mix of SRAM and ALCM–A on the B–52G/H offers the following advantages:

Allows for internal carriage of gravity bombs in the forward portion of the weapon bay, and increases bomber routing and targeting flexibility.

Disadvantage of this weapon mix combination is: ALCM–A may not have sufficient range to cover desired targets.

Question. Does the $104M requested for the TALCM development assume any financial support or reallocated resources from the current Tomahawk or GLCM programs?

Answer. The proposed TALCM program of $103.9M assumes neither financial support nor reallocated resources from the current Tomahawk or GLCM programs. This proposed program is built around using the existing management and engineering base of both Tomahawk and GLCM.

Question. What are the results of the calculations General Slay discussed with Senator Goldwater concerning effects on the performance characteristics of the B–52s from carrying ALCMs on pylons?

Answer. The B–52 can carry 12 external ALCMs and fly at low level at [deleted] or at high altitude at [deleted.] As an example, with one air refueling from a "buddy" KC–135 the [deleted] could fly [deleted] NM to a launch position, launch the missiles, and return [deleted] NM to a post-strike base.

Question. Please discuss the likely impact on tanker requirements of the postulated mixed force of the mid-1980's. Please indicate what band of likely possibilities can be projected including the high and low estimates? Compared with the best estimates of tankers required to support the previously planned B–1 force.

Answer. Initial examination shows [deleted] in tanker requirements for the postulated 1980 force when compared to either the present force or the previously planned force employing the B–1.

Strategic forces constitute only a portion of the refueling task, when considering [deleted].

[Deleted.]

Question. Please provide as complete a list of ways in which the TALCM could be modified to conform with a 2500 Km SALT limit on range. Which of these modifications could be verifiable by national technical means?

Answer. At DSARC II the range of the TALCM was estimated to be approximately [deleted]. These figures vary widely, [deleted] however, depending on the amount of terrain following to be accomplished. Possible methods of Range Reductions are:

a. Range could be reduced by approximately [deleted] by changing fuel from JP–9 to JP–4. This would bring the [deleted].

b. Flight profiles could be modified through techniques such as: (1) more terrain sensitivity; (2) more altitude changes; and, (3) more throttle changes.

c. Speed during the mission could be increased to greater than [deleted].

d. And finally, if necessary, size of the fuel tank or the fuel load could be varied to reduce the range.

[Deleted.]

Question. Of the [deleted] percent target base beyond the range of [deleted] kilometer cruise missile launched [deleted] what portion could the B–1 have reached?

Answer. The B–1 could cover [deleted] of the targets beyond the [deleted] KM cruise missile range [deleted].

Question. What portion could be reached by a penetrating B–52?

Answer. The B–52 could cover [deleted] of the targets beyond the [deleted] KM cruise missile range. For example, [deleted].

Question. What characteristics does this [deleted] percent of the target base have in terms of quality of air defenses, target value, and any other qualities significant to the operational planner?

Answer. The area beyond a [deleted] KM cruise missile's range includes:

a. [Deleted.]
b. [Deleted.]
c. [Deleted.]
d. [Deleted.]
e. [Deleted.]

Question. Is it likely that the Soviets would move targets of importance to that area to make them more secure against the cruise missile?

Answer. It is most unlikely that the Soviets would move targets to make them more secure against cruise missiles.

[Deleted.]

If the Soviets build new installations, one criteria could be a location that is out of cruise missile range from launch points they have postulated.

Question. Please compare the postulated mixed force of the mid 1980s with the previously planned B–1 force with the current B–52 force and in terms of their usefulness in a conventional war.

Answer. [Deleted].

Question. In any of these cases, would SIOP committed aircraft be re-allocated to a conventional war?

Answer. [Deleted.]

Question. If we used the B–52D's in the mixed force how much would that reduce our potential bomber capability in a conventional war?

Answer. [Deleted].

Question. Secretary Brown testified to the House Armed Services Committee on August 2, that our "relative reliance" on SLBMs "will continue to grow, with SLBMs providing perhaps [deleted] penetrating weapons by 1986." Please provide the calculations which support that assertion. Also please provide comparative calculations for a force with the B–1 as previously planned.

Answer. The requested data, and corresponding data for the B–52 with cruise missiles, follows:

Warheads:	*Total percent*
Online	[Deleted]
Surviving	
Arriving	

Question. Secretary Brown stated in the same testimony that the FB–111H would provide no significant advantage in cost or effectiveness over the B–1 but that "now that we have canceled production of the B–1, it may turn out that beginning in a few years from now it will be less expensive to maintain some version of the FB–111 as an option for an advanced penetrator than the B–1." Please explain the basis for this second conclusion.

Answer. If it should be determined that an advanced aircraft were needed in the penetrating component of the bomber force, a version of the FB–111 might be less expensive to maintain in small numbers than might a small force of B–1's. This thought is derived from recent analysis which showed the FB–111 to be roughly equal to the B–1 in cost-effectiveness.

Question. In the classified annex to Secretary Brown's testimony to the House Armed Services Committee, three charts reviewed forces [deleted] What is the basis for these criteria?

Answer. [Deleted.]

Question. Are these levels of damage postulated as examples?

Answer. Yes, these levels of damage are illustrative of our strategic capability.

Question. Are they consistent with the definitive targeting guidance to the Department from the President and the Secretary of Defense? If not in what ways are they inconsistent?

Answer. [Deleted.]

Question. Does the Secretary's use of these indicators suggest a redefinition of our targeting guidance which he and the President will direct? Please provide comparable charts reflecting the same calculations based on a force required to execute current targeting guidance.

Answer. The use of these indicators does not suggest a redefinition of our targeting guidance. Targeting guidance is currently under review by the Administration but changes will not be made before additional studies are undertaken. Comparable charts reflecting the results of targeting as done in developing the SIOP is impossible because of the length of time required for the development of each individual targeting plan for a particular set of U.S. forces and Soviet defenses.

Question. Does PRM–10 propose changes in the targeting guidance regarding required levels of destruction of different classes of targets? If so, please provide comparable charts reflecting the same calculations based on a force required execute targeting guidance as PRM–10 would propose to revise it.

Answer. As one portion of the overall review of national defense options, PRM–10 studied a number of different alternatives for targeting guidance required for deterrence and defense, if deterrence fails. No recommendation for a change in current U.S. targeting guidance would be made before additional study of very specific options is undertaken.

Question. What specific contributions to decisions relating to the deployment and use of strategic systems are to be made by the improvements requested?

Answer. The improvements in tactical warning systems will provide the NCA with [deleted] improved attack characterization information so that our response to an attack (less than massive) may be related to the type attack incurred. Deployment options of future strategic systems may be assessed based on the ability of our warning and attack assessment system to identify, warn, and characterize attacks against the U.S. strategic forces.

Question. As it applies to the option selected for air breathing strategic attack capability, how does the data gained from the four tactical warning improvements affect the deployment, use, availability and survivability of cruise missiles and their carriers?

Answer. By providing improved tactical warning and attack characterization from SLBM and ICBM attacks, these modifications will provide the NCA more decisionmaking flexibility in selection of responses with our strategic forces, including cruise missiles.

Question. What is the value of these changes to any later changes in U.S. strategy as to launch-on-warning and various forms of controlled response?

Answer. These changes in tactical warning systems will enhance the quality and quantity of data provided the JCS and NCA for force commitments. The precise improvements in both qualitative and quantitative terms will be provided by the HQ USAF Warning Systems Study which is nearing completion.

Question. Given an attack, how much advance warning of impact is provided [deleted]? What other attack parameters are provided?

Answer. For an ICBM launched against the CONUS, the [deleted] will provide warning before [deleted] depending on launch site, missile type and target. Warning times are for minimum energy trajectory. For SLBM raids, [deleted] warning time (initial report) for the SSN–6 will vary from [deleted] at [deleted] nm flight range to [deleted] nm flight range. For the SSN–S, warning time varies from [deleted] at [deleted] nm flight range to [deleted] at [deleted] nm flight range. Warning times are for a minimum energy trajectory.

[Deleted.]

Question. How will the application of Missile Surveillance Technology at the current and proposed fiscal year 78 levels eventually improve attack knowledge?

When will these improvements in Missile Surveillance Technology be implemented under current and proposed fiscal year 78 funding levels?

Answer. The current Missile Surveillance Technology Program is directed at providing staring mosaic sensors having significantly improved sensitivity; sensitivity necessary to see dimmer target. Evolving Soviet technology could employ a number of technique to increase their ICBM/SLBM capabilities [deleted]. The amended fiscal year 78 program would continue current parallel development contracts into 1979. Extending the parallel competition sensor development is expected to provide enhanced technological development of two uniquely different and technically promising approaches; each approach providing technology potentially beneficial [deleted]. Continuation of the parallel efforts will also provide additional competition incentive for superior technology development. Current plans are for a demonstration orbital flight of the mosaic sensor [deleted] with a decision for [deleted]. There would be no change in the time availability of the technology between the current and proposed fiscal year 78 request.

Question. Specifically, how will the improvements in Missile Surveillance Technology affect the deployment and employment of strategic systems? What will be the impact on decision-making relating to the use of strategic systems if the request for eight million dollars for Missile Surveillance Technology is denied?

Answer. The employment of this technology will provide the capability to assure warning of an ICBM/SLBM attack through the 20th Century. Warning times should be comparable or even better than [deleted]. Today, in an environment of advanced technology application by the Soviets, [deleted]. Technical options, such as [deleted]. Although these options are difficult to implement and would take three to four years to incorporate, they are feasible and the Soviets have been experimenting in these areas. In addition to providing [deleted]. If these funds are denied, the risk to insuring informed decision-making on the use of our strategic systems in the future will be greatly increased. This is because the risk in developing a sensor [deleted] will be high. The additional funds reduce this risk by continuing parallel development of two unique sensor approaches to allow selection to be made on hardware demonstration instead of paper analyses.

Question. What is the current capability of PAR in RV handling and CONUS area coverage? What are the specific improvements which are to be made?

Answer. The PAR provides booster/tankage track to a maximum range of [deleted] NM. It will handle up to [deleted] providing accurate impact data. The proposed software improvements will extend the range for tank discrimination to approximately [deleted] thus providing earlier attack assessment, increased threat area coverage to include nearly all of the CONUS, as well as several times the RV traffic handling capacity.

Question. What is the value of these changes to decisions relating to the use of each strategic system?

Answer. These modifications will provide attack characterization data based on RV tracking for use in attack assessment. Higher quality information on the size and nature of an attack will enable more selective response decisions and reduce the risk of escalation in less than all-out conflict.

Question. Provide a description of the Warning Information Correlation System. Upon what data sources will it draw? What system will not provide input to it? How will its use affect decisions on the deployment and use of each strategic system?

Answer. Warning Information Correlation (WIC) program products are computer software detailed designs that on-site programmers will install in computers of the National Military Command System (including NORAD, and SAC command centers). It uses data from missile warning systems—currently only BMEWS, but ultimately [deleted] BMEWS, COBRA DANE, PAR, PAVE PAWS, FPS–85, and IONDS. Data from other missile and NUDET surveillance systems will not be fed into the WIC software. Simply put, higher quality information on the size and nature of an attack will enable more selective response decisions and reduce the risk of escalation in less than all-out conflict.

Question. What is the relationship of the Warning Information Correlation System to the intelligence indication and warning system?

Answer. No relationship. WIC is tactical warning and attack characterization only.

FISCAL YEAR 1978 SUPPLEMENTAL MILITARY AUTHORIZATION

WEDNESDAY, AUGUST 24, 1977

U.S. SENATE,
SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room 224, Russell Senate Office Building, Hon. Thomas J. McIntyre (chairman) presiding.

Present: Senators McIntyre and Goldwater.

Also present: Larry K. Smith, Robert Q. Old, E. George Riedel, George H. Foster, professional staff members; Rhett B. Dawson, counsel; Susan Pitts, assistant to Senator McIntyre; and Charles Stevenson, assistant to Senator Culver.

Senator MCINTYRE. The subcommittee will come to order.

We convene this morning to continue our review of S. 1863, the Fiscal Year 1978 Supplemental Defense Authorization bill.

This morning we will receive testimony from Gen. Richard Ellis, Commander in Chief of the Strategic Air Command and Director of the Joint Strategic Target Planning Staff, and his team.

It might be helpful if I made three preliminary comments.

First, this committee shares the pride our Nation has in the quiet, consummate competence of the Strategic Air Command and the Joint Strategic Target Planning Staff (JSTPS). I know of no place in our Government or our society where there is a more impressive concentration of sustained professionalism than in these organizations.

Second, we appreciate your willingness to come to our committee and provide us your straightforward, best judgment. To be quite candid, there should be no nervousness in the Department of Defense that we have sought your counsel on these difficult and often hotly debated issues.

We don't seek to pit you in any way against your civilian leaders in the Department. I feel quite strongly that the quality of national decisionmaking is well served by having a variety of views on the detailed analytic questions we will discuss today. I am confident your free expression of your best professional judgments here in no way qualifies your willingness to accept, support, and execute decisions which are properly the responsibility of elected and appointed civilian officials. We are interested only in practical, analytic issues here, not in politics.

Third, we recognize, General Ellis, that you have been at SAC only about 3 weeks now and as experienced as you are generally, you may wish to draw fully on the collective counsel and talent of your elite team that you have brought with you. Since this is a relatively unhurried day, I hope we will be able to explore these issues in an open informal fashion which will help us get directly at the issues.

Senator Goldwater, I want to thank you for your fine suggestion that we invite General Ellis to testify. I am confident today's testimony will be helpful. Our judgments regarding the President's proposals for our future bomber force will depend heavily on our practical understanding of the operational effectiveness of this force which will be targeted and operated by General Ellis and his successors at SAC and JSTPS.

Senator Goldwater.

Senator GOLDWATER. Thank you, Mr. Chairman.

Mr. Chairman, you will recall that during our hearing on July 27, I indicated the extreme importance I attached to these hearings and that we should not rush our deliberations. Also at that time I suggested that it might aid our understanding of the issues associated with this supplemental request if the Commander in Chief of Strategic Air Command could provide his views on how the B–1 cancellation will impact on the future strategic force and its ability to support the SIOP.

I thank you, Mr. Chairman, for agreeing to ask General Ellis, CINCSAC, to appear before the subcommittee and I welcome General Ellis and his staff. General Ellis, I think your views, as well as the views of any of your staff you may wish to call on, will be very helpful to us.

Mr. Chairman, I have known General Ellis for many years and he has had a very distinguished career. As a general officer, he has held many important positions, among them Director of Plans for the Air Staff, Vice Chief of Staff of the Air Force, Commander in Chief U.S. Air Forces Europe, and now CINCSAC and Director of the Joint Strategic Target Planning Staff. Even though General Ellis may not feel that he is totally up to speed on all of the complexities of the strategic mission and the JSTPS since he just recently assumed these two positions, we will still value his judgments and opinions on these issues very much. As his statement mentions, he has brought along some "corporate memory" and we will be pleased to hear from his staff whenever he deems it necessary.

Mr. Chairman, having the Commander in Chief Strategic Air Command appear before our committee is not unique. During the course of the B–1 program we have also heard from General Ellis' predecessors, General Meyer and General Dougherty, and I found their advice and judgments valuable.

In February 1976 I also wrote General Dougherty and asked him why Strategic Air Command did not support the various alternatives to the B–1 that had been suggested. He replied that the command has not supported these alternatives for the overall reasons that none has stood the test of long-term sufficiency, cost effectiveness, or supportability over the years ahead. He further indicated that, while some of the alternatives had superficial or analytical appeal, they did not measure up with those of us who must maintain and operate our deterrent forces.

Of course, Mr. Chairman, we are now being asked in this supplemental request to support one of those alternatives.

General Dougherty went on to say that the operational B–52 has carried a primary deterrent load for over 20 years, and its ability to adapt to change and modification is not infinite. He reminded that the aircraft is soft to blast effects; its launch and escape time is relatively

long; its radar reflectivity is great; it has no supersonic capability; it cannot penetrate at extremely low altitudes; it is expensive to man and maintain; and its design characteristics preclude flexibility in dispersal and deployment. He then said that even though modified and upgraded, the B–52 would be perceived as "nothing new" in the dynamics of deterrence.

Mr. Chairman, it was the President's decision to cancel the B–1 production program and I do not question his right to do that. Nevertheless, that does not keep me from believing his decision was wrong because the alternative of increased reliance on cruise missiles and the aging B–52 force could place us in a far less capable position to retaliate if required.

From General Dougherty's letter I conclude that future reliance on the B–52, to the extent now planned by this administration, may cause some difficulty. I hope we will be able to explore this with General Ellis and his team. I do take some consolation in the response of Dr. Perry to one of my questions for the record during our last meeting. I asked Dr. Perry, "Can you testify unequivocally that the now planned-for strategic force will mean no degradation in our ability to carry out the SIOP when this force is in the inventory? Can we expect the targets in the SIOP to be destroyed with the same level of damage expectancy?" Dr. Perry responded "Yes, the programed modernized bomber force will result in greater numbers of more effective warheads. We can expect targets to be destroyed at higher levels of damage as these more accurate systems are deployed."

It will be interesting to see if those who have the operational responsibility have the same confidence about this matter as does Dr. Perry.

Thank you, Mr. Chairman.

Senator McIntyre. Thank you, Senator.

General Ellis and Admiral McMullen, along with your supporting witnesses who I understand to be Major General Larson, Major General Miller, Brigadier General Burke, and Brigadier General Enney, we welcome you here this morning and now, General Ellis, I think it is appropriate for you to proceed with your statement.

STATEMENT OF GEN. RICHARD H. ELLIS, COMMANDER IN CHIEF, STRATEGIC AIR COMMAND (SAC) AND DIRECTOR, JOINT STRATEGIC TARGET PLANNING STAFF, AND VICE ADM. FRANK D. McMULLEN, JR., VICE DIRECTOR, JOINT STRATEGIC TARGET PLANNING STAFF; ACCOMPANIED BY MAJ. GEN. DOYLE E. LARSON, DEPUTY CHIEF OF STAFF, INTELLIGENCE, STRATEGIC AIR COMMAND; MAJ. GEN. GEORGE D. MILLER, CHIEF, SINGLE INTEGRATED OPERATIONAL PLAN DIRECTORATE, JOINT STRATEGIC TARGET PLANNING STAFF AND DEPUTY CHIEF OF STAFF, OPERATIONS PLANS, STRATEGIC AIR COMMAND; BRIG. GEN. KELLY H. BURKE, ASSISTANT DEPUTY CHIEF OF STAFF, PLANS, STRATEGIC AIR COMMAND; AND BRIG. GEN. JAMES C. ENNEY, CHIEF, NATIONAL STRATEGIC TARGET LIST DIRECTORATE, JOINT STRATEGIC TARGET PLANNING STAFF

General Ellis. Good morning, Mr. Chairman and Senator Goldwater.

I am pleased and honored to have the opportunity to appear before this subcommittee to offer my views—both as Director of the Joint Strategic Target Planning Staff and as Commander in Chief of the Strategic Air Command. All of us are most appreciative of the key role played by this subcommittee and its parent committee in the structuring of our Nation's strategic forces; therefore, I am particularly pleased that my first congressional apearance in my new appointment is before the Research and Development Subcommittee.

Because my tenure at Offutt barely exceeds 3 weeks, I have taken the liberty of bringing with me senior members from both staffs. Representing the Joint Strategic Target Planning Staff is our Vice Director, Vice Adm. Frank McMullen, and his two principal assistants, Brig. Gen. Jim Enney who is responsible for development of the national strategic target list; and Maj. Gen. George Miller, who takes that target list, applies the available forces to it, and produces the SIOP (single integrated operational plan), our Nation's general nuclear war plan. From SAC, I have brought Maj. Gen. Doyle Larson, our intelligence officer; and Brig. Gen., soon to be Maj. Gen., Kelly Burke, our planner. Among our group, I believe there is sufficient corporate knowledge and memory to respond to your questions.

You have asked that we discuss with you today the adequacy of our strategic forces to carry out the strategic mission in the mid-eighties—within the parameters of proposed future strategic offensive forces. We make this assessment based upon the President's proposed adjustment to the fiscal year 1978 defense budget—which you are now considering. This supplemental is presented in compliance with recent Presidential actions, including his decision not to continue the B–1 program.

As far as I am able to determine, all interested parties including representatives from the Strategic Air Command—were all allowed to present pertinent arguments regarding B–1 procurement. It was the considered evaluation of responsible members of SAC, the Air Force and the Joint Chiefs of Staff that B–1 procurement was the most effective option for near-term strategic force modernization. That was a military judgment; but we recognize that such decisions are based on much more than purely military considerations and that even these are subject to some variance of interpretation. We have accepted the decision and are determined to work the problems of the future without a B–1, integrating the cruise missile into our existing force with the greatest possible efficiency and making the best possible recommendations concerning improvements and modernization of strategic forces.

A first objective in my new assignment was to satisfy myself that we were prepared to carry out our responsibilities today. I was impressed by the quality and present efficiency of the weapons systems assigned to SAC—and even more impressed by the professional competence and dedication of the men and women of SAC who are responsible for these weapons systems. Equally impressive was the superb planning—done in exquisite but necessary detail—for the application of the SAC forces and the SLBM's accomplished by the Joint Strategic Target Planning Staff. I am satisfied that sufficient strategic forces are available now to carry out national level guidance and that those forces are employed with wisdom and care. I am satisfied that the job is being done today—

and well. Our forces are contributing importantly as the ultimate military deterrent across the entire spectrum of conflict and confrontation. I can assert this with confidence because of the wise decisions and prudent investments our Nation has made in the past that provide the strength and capability we enjoy today. The major thrust of your current hearing, as I understand it, is to insure that my successor—5, 10, or 20 years from now—can make that same assertion with the same degree of confidence and conviction. With that thought in mind, I would like now to turn to the pending supplemental bill and assess its impact on future strategic capabilities.

My comments are keyed to four critical assumptions. First, there will be no fundamental changes in national strategic policy as established or in the guidance that flows to us from that policy. Changing considerations will, of course, result in modifications and shifts of emphasis; but in the absence of a dramatic reordering of world conditions, I am assuming no major or radical changes in existing basic policies and guidance. Because of the absolute importance of those policies and resultant guidance both in development and employment of strategic forces, Admiral McMullen will later review with you the existing guidance and the planning that ensues.

ESSENTIAL EQUIVALENCE

The second major assumption I make is that within our overall strategic policy we will continue a specific policy of "essential equivalence" or approximate parity of strategic forces with the Soviet Union. This is a policy espoused by the President; it is a policy endorsed by both Houses of Congress in the enactment of Public Law 92–448 and, according to all the evidence I have seen, it is the minimum position acceptable to an overwhelming majority of the American people. So I think it will prevail.

Flowing from this is my third assumption: That within the framework of essential equivalence we will continue to divide our strategic forces among the legs of the triad. Both the President and Secretary of Defense support the concept of a strategic triad. as I believe, do most Members of Congress. I know the value of the triad is fully appreciated by this subcommittee.

My fourth and final assumption is that the bomber or air-breathing leg of the triad will, for the foreseeable future, include a substantial, consequential force of manned, penetrating bombers. This assumption is less widely shared than the three preceding, but I believe just as solidly based. Some, I fear, have misread the endorsement of cruise missiles by the President and Secretary of Defense as the death knell of the manned penetrating bomber. I have read their statements carefully and find no such meaning, explicit or implicit. On the contrary, in announcing his decision to terminate B–1 production in favor of development of air launched cruise missiles, the President said:

> Our triad concept of retaining three basic delivery systems will be continued: the submarine launched ballistic missiles, the intercontinental ballistic missiles and a bomber fleet including cruise missiles as one of its elements.

I think his qualification of cruise missiles as one element of the bomber fleet clearly conveys his intent to support the other element—

the manned penetrator. In his press conference the following day, the Secretary of Defense expressed his opinion that B–52's will continue to be effective penetrating bombers for at least the next 10 years. He did not predict they would cease to be effective at that juncture, stating only that he could not "see further ahead than that." Moreover, both the President and Secretary of Defense have expressed a desire to retain some developmental efforts for a follow-on manned penetrating bomber as a hedge against an uncertain future. But also important to my assumption that we will retain manned penetrating bombers for the foreseeable future is a conviction that the facts and logic support that assumption and that rigorous analysis and thoughtful consideration will lead inevitably to that conclusion. I will say more about this later.

The bill does not address either SLBM's or ICBM's but I would be remiss not to comment on both.

My direct interest in the SLBM is limited to involvement with it as a planner, although I am also its enthusiastic supporter as a professional airman and citizen. As Secretary of Defense Brown has noted, we rely heavily on this system for its contribution to deterrence. It now accounts for an impressive percentage of our SIOP warheads and equivalent megatonnage. Once on station, moreover the missile submarine is virtually undetectable by the enemy, giving a great boost to our capability to inflict assured destruction. We look forward to incorporation of the Trident submarine and missile into the SIOP. It will provide additional targeting flexibility and longer times on station for our SLBM fleet. Today the SLBM is an essential partner in the triad; we expect it to remain so.

The ICBM is also a valuable contributor to the SIOP. More than [deleted] percent of all available ICBM's are ready for launch, all the time, against any one of several prestored targets. Our ICBM system also boasts the most reliable, timely, and redundant command control communications capability of triad members. It is also the most reliable SIOP weapon system against [deleted] targets such as airfields, submarine facilities, communications control centers, and the hard Soviet ICBM silos.

And certainly the ICBM is the most cost effective SIOP weapon system per alert hour. It costs less than $286,000 per year to maintain a Minuteman missile on alert, for example. This price includes all factors, ranging from operations, and maintenance to every aspect of the ICBM share of people-related expenditures.

It is clear that increases in Soviet ICBM warhead numbers and accuracy over the next decade can decrease the ability of the ICBM force to ride out a nuclear attack. This decrease could be compensated for in various ways. The proposed new ICBM, M–X, has great promise and could maintain all the desirable characteristics of ICBM's—effectiveness across the target spectrum, high alert rate, economy of operation—while improving on missile survivability and force capability, the latter through increased warhead capacity and improved accuracy.

AIR REFUELING FLEET

Nor does the pending bill cover the KC–135, but I would like to address it briefly because our KC–135 air refueling fleet is the key to

the flexibility and responsiveness of U.S. airpower—strategic, tactical, and airlift.

Managed, as you know, by Strategic Air Command, this tanker fleet is an indispensable element in allowing the United States to deploy tactical aircraft to any point on Earth rapidly enough to be effective in stopping an enemy attack. It also allows our cargo aircraft the ability to move their critical loads anywhere, any time, without dependence on en route staging bases and the delays which are required in such turnarounds. The tanker extends the mission duration of reconnaissance and command control platforms.

Finally, and most critically, the tanker is the flexible ranging component which enables our strategic bombers to fly nonstop to any combat environment, penetrate at various altitudes, strike even the deepest targets, and return safely to home or friendly airfields.

America's jet tanker fleet is a priceless airpower asset for peace and war. I submit to you that it will repay many times over the investment necessary to keep it operable. During the past 2 years as Commander in Chief, U.S. Air Forces Europe, I followed almost daily the progress of SAC tankers safely shepherding and refueling to and from Europe—not only SR–71's, U–2's, and B–52's, but also F–4's, F–15's, F–16's, F–111's and A–10's. Tankers are vital not only to our bomber force but to the tactical and airlift forces as well.

Turning to the specifics of the pending legislation, the bill contains some funds for improvements in our strategic warning systems. As you know, I am not directly responsible for those systems, but SAC is a prime customer of the warning information provided. As such, I am keenly aware of the importance of timely warning information and attack characterization and support strongly the improvement of these systems.

The bill also proposed major sums for cruise missiles, for associated carriers, and for improvements to existing bombers. These, I think, are so related that they cannot be discussed in isolation. Therefore, rather than a line-by-line comment, I believe it would be more useful if I offer my general views as to the best way to structure the bomber leg of our triad for the future.

The prospects of the air launched cruise missile are exciting. To me, it represents one of the things we Americans do best—the application of advanced technology to provide for defense needs. As with any developmental system, I would expect problems and growing pains, but I am confident in reasonable time the air-launched cruise missile will prove to be a highly valued component of our strategic inventory. The concept of a large transport-type aircraft as a standoff cruise missile carrier requires, and is receiving, extensive study. The obvious advantage of such a carrier is the economy of one aircraft carrying a very large number, [deleted] of cruise missiles. But there are also risks. For instance, given such a carrier, particularly if the range of the cruise missile is limited, the Soviets might concentrate their defense against the carrier aircraft as well as the individual missiles. Still, it certainly is worthwhile to explore this concept further to protect that option. Moreover, a modest developmental effort of such a cruise missile carrier could be beneficial to our SALT negotiations.

Within the context of the Presidential decision regarding the B–1

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and cruise missiles, let me outline the resultant force structure I have recommended as to how we can best configure and employ our strategic bomber force for the future. This recommendation represents our best judgment at SAC based on careful thought and analysis by the same people who are responsible for today's forces in the existing operational environment. In reaching our conclusions, we accepted the four assumptions I discussed earlier. In evaluating the various alternatives we applied the following criteria. The recommended force should:

Provide real and perceived deterrence across the widest possible spectrum of conflict—including conventional;

Maximize damage against the SIOP target base;

Be cost effective;

Hedge against SALT uncertainties—here we are concerned with the question of how cruise missile carriers will be counted and with the range limitations to be imposed on the missiles;

Hedge against cruise missile reliability and capability shortfall; and

Maximize Soviet expenditures on defensive systems.

Measured against those criteria the force that looks best to us would be structured as follows:

[Deleted.]

Recognizing that the proposed budget amendment envisions determination of ALCM–A, further study is needed to determine the optimum weapon loading, internal and external, for the B–52 fleet. But fundamental to our recommendation is our underlying premise that our current bombers—B–52's and FB–111's—will continue to be effective penetrators for a reasonable time; a sufficient time to justify the costs they will incur. Let me tackle those two questions head on. How long can B–52's and FB–111's penetrate effectively? How much investment will be required?

Before we ask how long our B–52's and FB–111's will remain effective penetrators, we first need to know how long they will remain structurally airworthy.

Fortunately, they are all solidly built aircraft and, fortunately, they have been well cared for. We recently rewinged 80 of our oldest B–52's, the D model and those 80 aircraft will be safely flyable until the mid-nineties. Most of the later model B–52's, the G and H models, will last until the late 1990's, and the FB–111's are good well into the next century. Parenthetically, I should mention that the KC–135 tanker that so dramatically increases the effectiveness of those bombers, with relatively minor modifications, is expected to be airworthy beyond the year 2025.

None of us can state with certainty how long our current bombers can effectively penetrate the Soviet Union. Clearly that will be determined by what the Soviets do and what we do, and our view of the future is murky at best. But this is a question that has been pursued with diligence at SAC for over 30 years. It is a question we examine continuously in a disciplined, analytical manner. Our studies are encouraging. The standard measurement of the effectiveness of a strategic force is DE; the "damage expectancy" against a target base, DE is the product of a number of factors. Looking as best we can into the future and assessing all reasonable possibilities, we expect only slight

changes upward and downward in most of these factors. But the critical and most generally debated variable is the probability to penetrate. In analyzing this particular factor, we assumed the Russians would continue their heavy investment in air defense and would deploy new systems [deleted] as fast as technology makes them available. But also assumed was that we would continue to modestly improve our bombers—improvements I will discuss shortly—and to adjust our tactics appropriately. We further assumed that the bombers would not fight alone and allowed for the complementary effects of the other two legs of the triad. The probability to penetrate for a B–52G or H today is [deleted] especially as these calculations assumed the Soviets would have spent vast sums of money for those defenses. Historically, they have spent at least three times as much to defend against our bombers as we have spent on our bomber force, and we would expect that ratio to at least continue and probably to increase.

I should add that the analyses which resulted in the probability to penetrate figures I have just cited were done before we envisioned the addition of large numbers of cruise missiles to the force. We have since assessed, in limited detail, the improved probability of our bombers to penetrate that will result from the confusion and saturation of defenses caused by substantial numbers of cruise missiles. Tentatively, it looks as though the complementary effects of cruise missiles will [deleted]. Again, this is tentative but I believe our more detailed analysis now underway will confirm that these figures are essentially correct.

Regardless of the uncertainty as to when our current bombers will cease to be effective, that time will inevitably come. But I don't think that will mark the end of the requirement for manned penetrators, and hopefully by then, a suitable replacement will be well along.

We did not formally assess beyond 1987, and I recognize clearly the hazards of offering predictions even that far in advance. But ours is a business that does not allow us the luxury of deferring decisions until the future becomes absolutely clear. So our opinion—based on the best evidence available—is that properly cared for and properly employed, our FB–111's and our latest B–52's can continue to be effective penetrators until 1987—and probably to 1990 or even beyond.

[Additional information follows:]

To maintain this level of effectiveness, expenditures for modification of these aircraft will be required. But those expenditures in comparison with other strategic programs will be quite modest and modest indeed when compared to Soviet defensive expenditures. Proposals have been made for extensive and costly modifications of the B–52s including a new wing and new engines. I don't find programs of that magnitude cost-effective. What would be required for the SAC recommended bomber force is:

Updated ECM for all bombers.
Improved offensive avionics for B–52s.
Improved B–52 tail guns.
[Deleted.]

The first of these, ECM modification, is a process we would expect to continue as long as the aircraft are in service. The others are one-time investments.

Previous legislation and the pending bill would provide for the continuation or initiation of all of these actions except the last and possibly it could be incorporated into some other program depending upon the weapon selected. Additionally, we need to continue our previously approved programs for improving the KC–135 avionics and for evaluating an engine replacement for the KC–

135. Finally, although not directly covered by this bill, is the need for intensive efforts to protect against the uncertainties of the future. The Air Force and SAC are presently exploring the available alternatives for protecting the option the President stated he desired—to upgrade penetrating bomber forces should conditions warrant. It begins to look as though certain FB–111 modifications might offer a good potential to keep this option viable.

A bomber structure as I have outlined above, with the improvements discussed, will retain that leg of our Triad as a valuable and highly effective force. The development and deployment of a substantial number of cruise missiles would add greatly to the flexibility and capability of the bomber force. But at the same time we would retain all of our current force of manned penetrating bombers with a proven capability, unequalled flexibility across the spectrum of conflict and options for improving its effectiveness. In combination, the deterrent contribution of these two elements of the bomber force—cruise missiles and penetrators—would exceed the sum of their parts. Such a bomber force would stress greatly the Soviet defenses with inevitable division and dilution of their defensive effectiveness. Such a bomber force, along with the other two legs of the Triad, properly modernized, will in my opinion, provide an effective deterrent force for some years to come.

General ELLIS. Gentlemen, that completes my statement and I thank you for your attention. Admiral McMullen will now review the existing strategic guidance and our current plans. Following that, we will be pleased to respond to your questions.

Senator MCINTYRE. Admiral.

Admiral MCMULLEN. Mr. Chairman, Senator Goldwater, I will be talking of the nuclear weapons employment policy of the United States

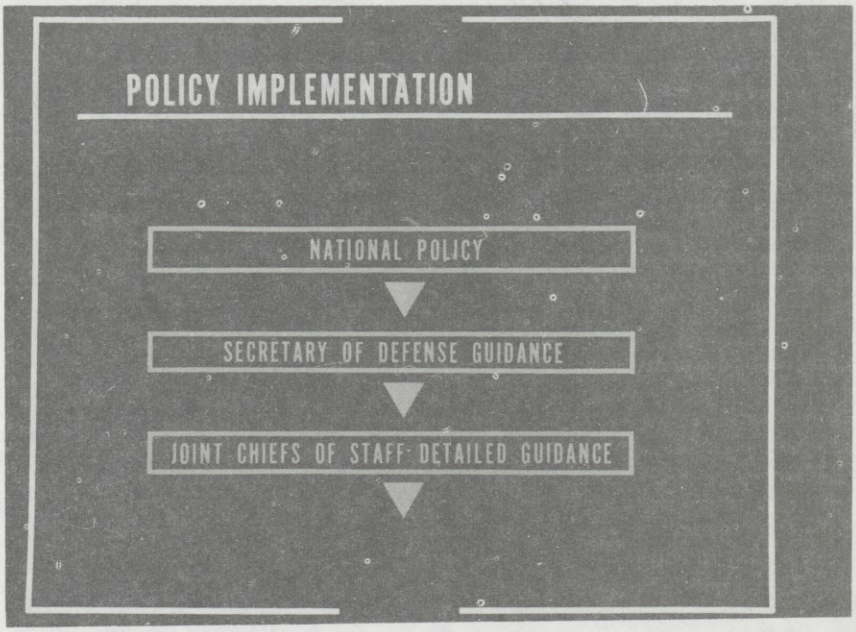
and the product of that policy, the Single Integrated Operational Plan. Of necessity, I will be talking about the Joint Strategic Target Planning Staff, which is the agency of the Joint Chiefs of Staff that is

responsible for the construction of this major strategic nuclear war plan.

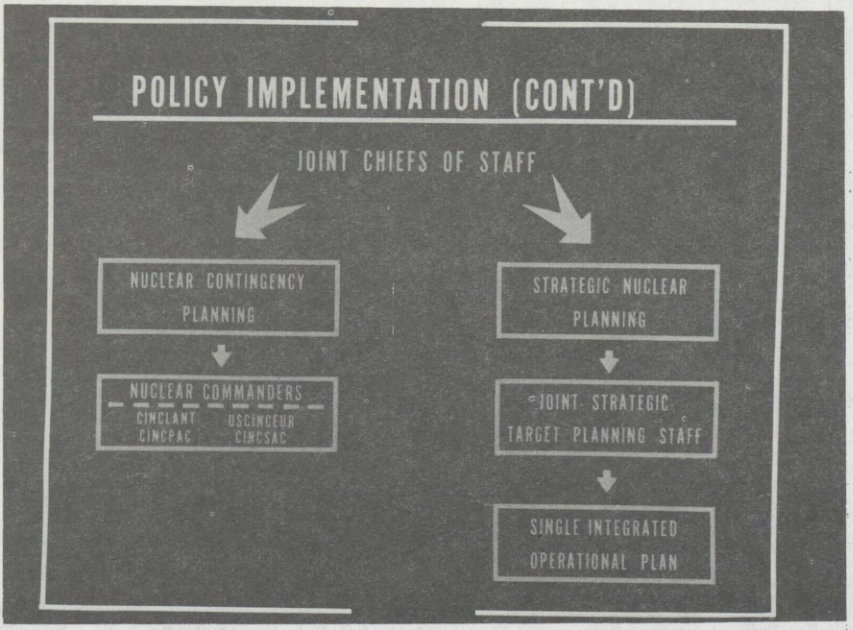
Since its inception in 1960 this Joint Planning Staff has planned five of these strategic nuclear strike plans. These plans provide for the integrated attacks of the strategic nuclear forces of the United States, and for coordinating the attacks of the nuclear weapons which are assigned to our NATO International Commanders.

The first four of these plans were based upon original national policy guidance, changing only slightly as new weapons entered the inventory, or as the target base itself [deleted] in some other way.

In 1974, however, there was an explicit change in national guidance and the plan which is in existence today reflects that guidance. This marked change introduced a broader range of targets. It is much more flexible in employing the weapons against these targets. It introduced the [deleted], and I will talk later about this, and finally it provided a linkage between the theater nuclear forces and the SIOP.

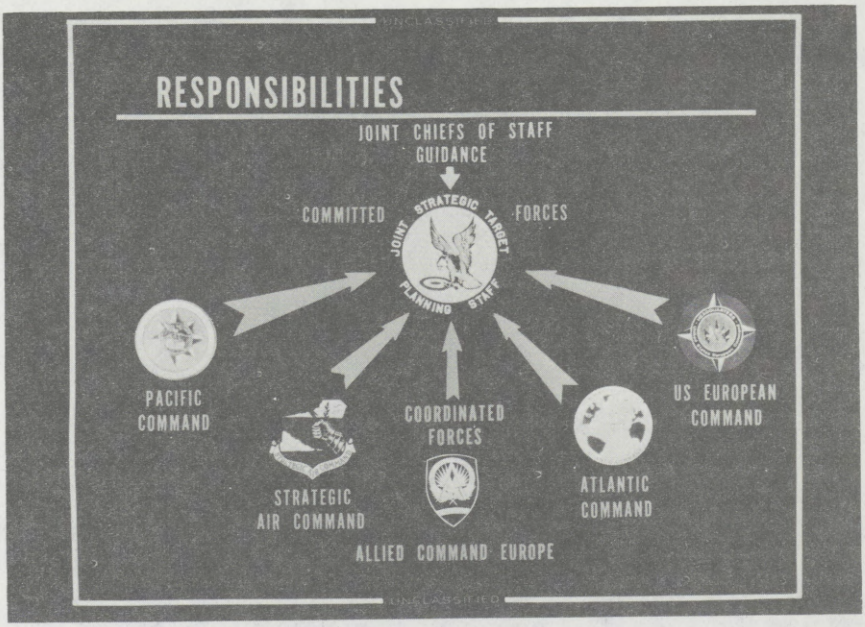


The national policy which was enunciated in January 1974 and transmitted to the Secretary of Defense, who issued guidance to the Joint Chiefs of Staff who, in turn, issued further detailed guidance to the nuclear commanders of the United States and to the Director of Strategic Target Planning.

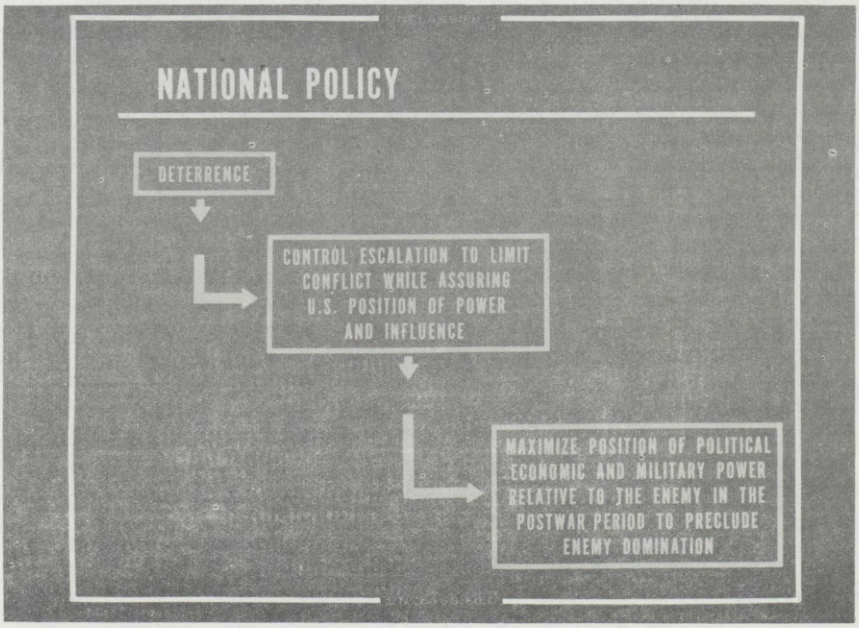


This guidance from the Joint Chiefs of Staff was divided into two parts. On the left it concerned nuclear contingency planning—which would be the province of the nuclear commanders: As indicated today, the Commander in Chief Atlantic, Admiral Kidd, Commander in Chief Pacific, Admiral Weisner, the Commander in Chief Europe, General Haig, and Commander in Chief of the Strategic Air Command, General Ellis.

Then, on the other side of the chart, the other part of the guidance from the Joint Chiefs of Staff concerned strategic nuclear planning, which was to be the province of the Joint Strategic Target Planning Staff, represented here today, and their product would be the Single Integrated Operational Plan.



In carrying out this responsibility, the Joint Strategic Target Planning Staff is given forces to target. As indicated by the green arrows, these are provided by the Major Nuclear Commanders. The Joint Strategic Target Planning Staff is further charged to coordinate the forces assigned to our Allied Command in Europe to insure that the weapons are optimized, to insure, too, that there are no conflicts either en route to or over the targets.



The objective of our national policy, starting in the upper left of the Vu-graph, is the deterrence of conventional and nuclear attacks, or attempting at coercion under the threat of such attacks against the United States, its allies, and any nation whose security is deemed vital to our interests.

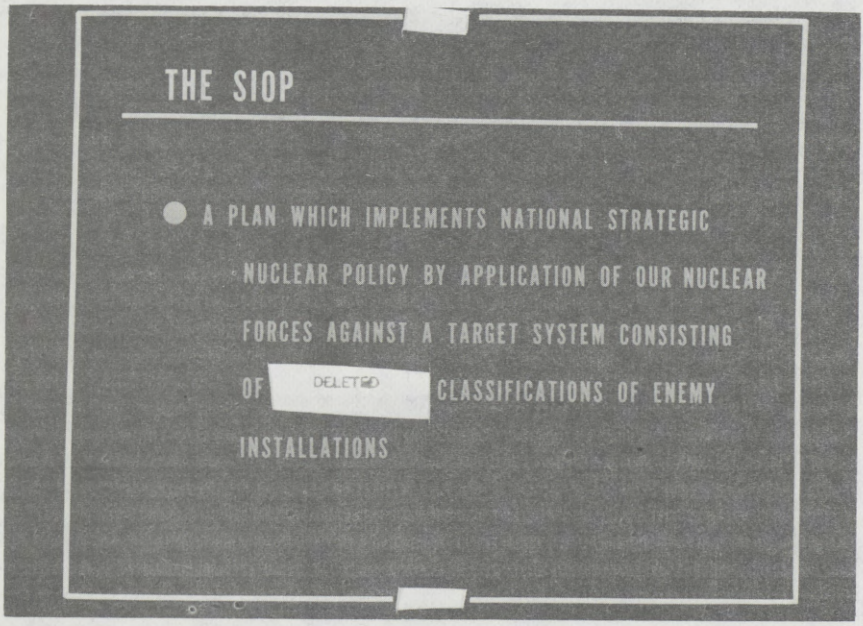
If deterrence fails, the objective of our national policy is as shown, to control escalation, if possible, to limit the conflict while assuring a U.S. position of power and influence.

If escalation control is unsuccessful, the objective of our national policy is to maximize the resultant of political, economic and military power of the United States relative to the enemy in the postwar period to preclude enemy domination.

[Slide deleted.]

The enemy in this sense, as prescribed in the guidance, is as shown.

The guidance tasked the Joint Strategic Target Planning Staff to develop a plan which will make it possible to place under attack these countries [deleted].



The SIOP, then, as shown on this chart, is a plan which implements our national policy by applying our nuclear forces against a target system which consists of [deleted] classifications of targets.

I will examine each of these in turn.

First, we will look at the [deleted] classifications of targets as prescribed in the guidance. We then will examine the forces which are available for application against those targets. Finally, we will look at the policy which governs how those forces specifically are applied against the targets.

[Slide deleted.]

We will then have the single integrated operational plan. Turning first to the [deleted] classifications of targets. They are as shown. [Deleted.]

From each of those categories, as prescribed in the guidance, the Joint Strategic Target Planning Staff selects targets which meet certain explicit criteria. We will examine how this is done and look in turn at each of those [deleted] classifications of targets as prescribed in the national guidance.

[Slide deleted.]

This is the heart of the policy.

[Deleted.]

Mr. SMITH. What is a "significant portion" defined by your guidance?

Admiral MCMULLEN. The current guidance prescribes that we should [deleted].

Mr. SMITH. [Deleted] what does that do in terms of your difficulty to execute your guidance? Is there a curve that bends out after a while?

Admiral MCMULLEN. Undoubtedly there is. There is a key factor to recognize, however, that is as we identify more of the target base of a potential enemy, we find that those [deleted] we have not specifically taken credit for it.

Mr. SMITH. Is there any percentage defined in your guidance regarding [deleted].

Admiral MCMULLEN. Under the current guidance, we [deleted].

Mr. SMITH. But are you specifically tasked?

Admiral MCMULLEN. Yes; in the current guidance we are specifically tasked to——

Mr. SMITH. To [deleted].

Admiral MCMULLEN. Yes.

Mr. SMITH. And that percentage is [deleted] percent?

Admiral MCMULLEN. It is [deleted] percent.

Mr. SMITH. I am sorry——

Admiral MCMULLEN. Yes, [deleted].

Mr. SMITH. [Deleted.].

Admiral MCMULLEN. This would be [deleted].

Mr. SMITH. [Deleted.].

Admiral MCMULLEN. Yes.

Mr. SMITH. Thank you.

Admiral MCMULLEN. A small subset of this, compared with the totality of [deleted].

Senator MCINTYRE. Proceed.

[Slide deleted.]

Admiral MCMULLEN. These are the types of installations which are [deleted].

This is the essence of the guidance.

[Slide deleted.]

For example, these are the [deleted].

Senator GOLDWATER. Could I ask you a question at this point?

Admiral MCMULLEN. Yes, sir.

Senator GOLDWATER. [Deleted.]

Admiral MCMULLEN. [Deleted.]

Mr. SMITH. [Deleted.]

Admiral McMULLEN. Did this appear in [deleted].

Mr. SMITH. Was it a constant from earlier guidance?

Admiral McMULLEN. I think this has been persistent across the years.

Mr. SMITH. I remember asking that question of your predecessor. I wondered if there had been any further inquiry? His understanding was that the term had been a constant from the early guidance, we had always been required to [deleted]. There was never any further definition. That language was a constant throughout.

Admiral McMULLEN. I think that is correct. I intuitively think it sounds reasonable.

[Slide deleted.]

These are the types of installations which are in the [deleted].

[Slide deleted.]

These are the types of facilities and installations in this category.

Senator GOLDWATER. Pardon me, Admiral. Would that be a sole assignment to SAC or would TAC participate in that?

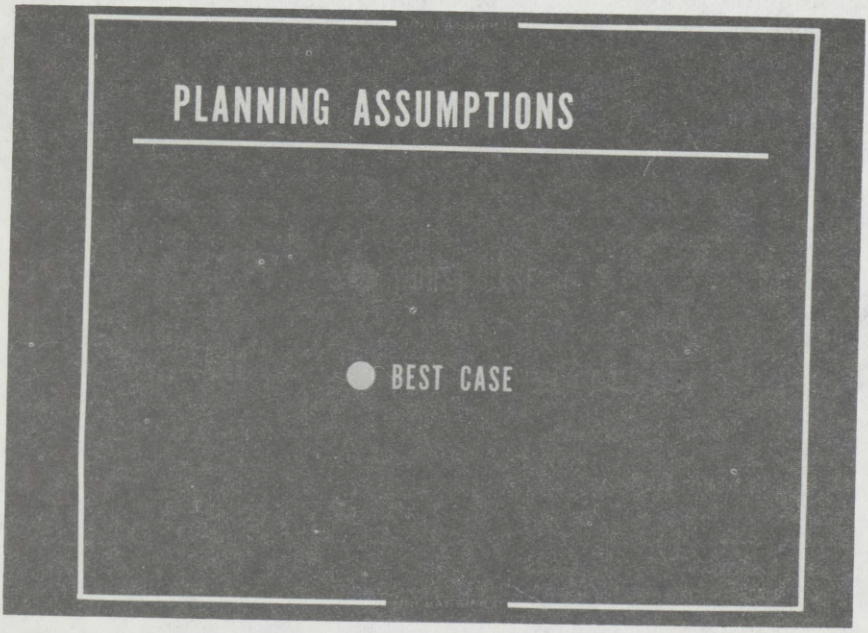
Admiral McMULLEN. We are talking, Senator Goldwater, of the strategic plan today, so I am talking this morning of the application of our strategic forces.

This would be the triad which would be involved here. I will defer the question of the TAC role to perhaps, General Ellis.

Senator Goldwater. [Deleted.]

General ELLIS. [Deleted.]

Admiral McMULLEN. [Deleted.]



Having looked now at the [deleted] targets and the guidance which controls our selectivity of targets within those classifications, we will look now at the forces which are available to apply against that target system. There are an infinite number of cases under which you could apply weapons to targets. To make the task manageable, we look at two planning assumptions. We call one a worst case and we call one a best case.

[Slide deleted.]

Our definition of "worst" and "best" is as indicated.

[Deleted.]

The color coding that I show here will be used as we look at our forces. Alert reflects those forces that are on alert as of a given day. Generated indicates those forces that with some strategic warning could be brought to an alert state. They will be shown as we look at the slides of the triad in red and green.

[Slide deleted.]

Looking first at the sea-launched ballistic missile leg of the strategic triad of weapons, submarines, as shown, are on alert [deleted].

[Slide deleted.]

Almost all of the entire contingent of intercontinental ballastic missiles is on alert. That small percentage which is not on alert is down for maintenance training and can be brought up on alert as directed.

Senator GOLDWATER. Is that [deleted]?

Admiral MCMULLEN. There are 1,054. These figures reflect the modernization program which has been ongoing, therefore some were not committed to the plan. The [deleted] shown are committed to the SIOP and available every day.

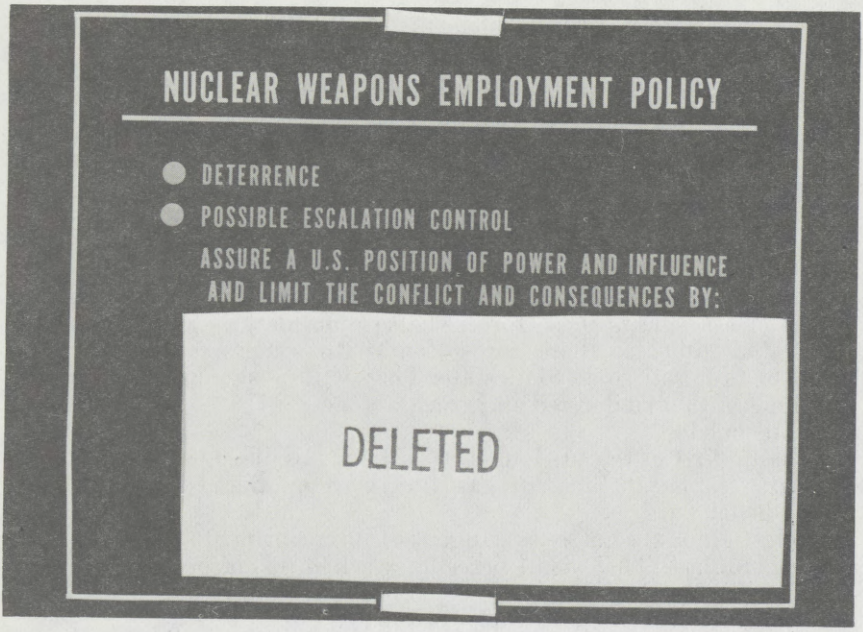
General BURKE. That would reflect [deleted].

Senator GOLDWATER. Is that [deleted] and so forth?

Admiral MCMULLEN. This is the total in the ground, in the silo ready to launch on a day-to-day basis. [Slide deleted.] This is the strategic bomber leg of the triad. About one-third of the force is on day-to-day alert, as can be seen.

Senator GOLDWATER. Does that include the FB–111?

Admiral MCMULLEN. Yes, sir; we looked at the classification of targets and we have examined the forces which are available for application against these targets. We will now look at the guidance which controls how these forces are applied against the targets.



Again, in the guidance, the objective of our national policy is deterrence. If it fails, the next objective is if possible, to control escalation, to limit the conflict and its consequences and assure a position of U.S. power and influence.

We attempt this in [deleted].

[Deleted.]

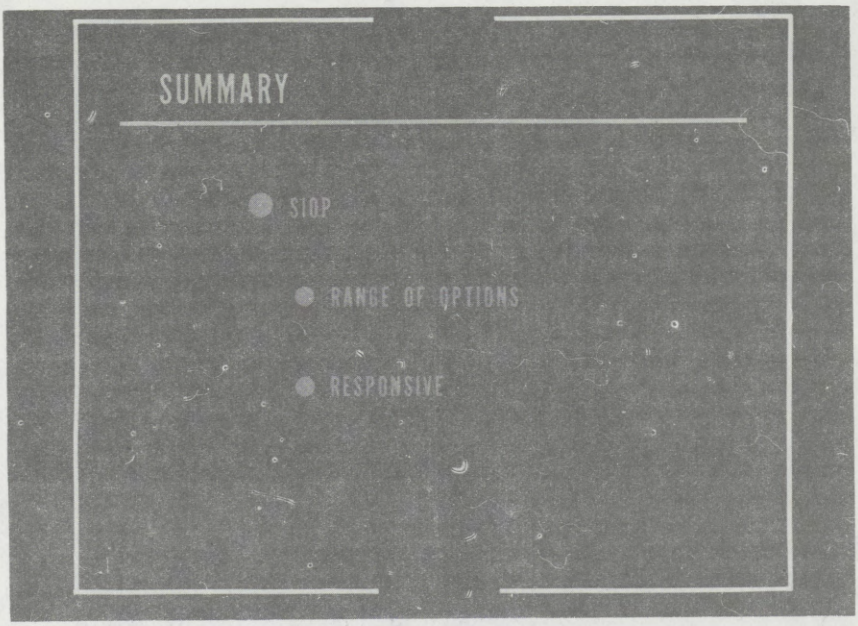
Mr. SMITH. For the completeness of the record, it should be noted that, while that requirement is there, we have an ABM treaty which inhibits severely the capacity to limit damage through ABM's.

Moreover, we have virtually no air defense against Soviet bombers as a matter of national policy. Just to mention two items that seems particularly pertinent.

Thank you, sir.

[Slide deleted.]

Admiral MCMULLEN. [Deleted.]



The SIOP then is a plan which follows very explicitly our national policy. It applies weapons to prescribed systems of targets. It has a wide range of options available to the national command authorities, and it is responsive also in ways that I have not specifically addressed today. It is responsive to [deleted].

Mr. Chairman, that completes my presentation.

Mr. SMITH. Going back to the slide [deleted] which was displayed in the presentation, we are aware that is simply a term taken out of a much more complex presentation.

Could you describe as a vignette into your methodology what [deleted] in fact does do?

[Slide deleted.]

Admiral MCMULLEN. If I may, Mr. Smith, I have a slide here. These are currently [deleted].

Mr. SMITH. As I understand, Admiral, [deleted].

Admiral MCMULLEN. Yes, sir.

Mr. SMITH. [Deleted.]

Admiral MCMULLEN. How many weapons?

Mr. SMITH. Yes.

Pick out any one of those three. About how many would it be? Would it be in the hundreds or dozens?

Admiral MCMULLEN. No; if we take, for example, [deleted].

Mr. SMITH. [Deleted.]

Admiral MCMULLEN. That is right.

Mr. SMITH. Thank you. Now, if you go to the slide on the [deleted].

Admiral MCMULLEN. Yes, sir.

Mr. SMITH. As I understood it, this is also a refinement of our targeting methodology that was defined in 1974 and one which the subcommittee has supported as a prudent refinement.

Could you describe just briefly how that would work, practically, about how many weapons you allocate to it, and what kinds of things would they do if it were used?

Admiral McMULLEN. This force is reflective of about [deleted].

[Deleted.]

Admiral McMULLEN. Yes.

Mr. SMITH. The reason I bring it out, I am not sure that is a point that is generally appreciated. It seems a very important concept.

One other question. When [deleted]. What was the general effect?

Admiral McMULLEN. I was not on the scene then, but let me turn to our staff and see if any of those can answer.

Captain STOVALL. [Deleted.]

General BURKE. [Deleted.]

Admiral McMULLEN. [Deleted.]

For example, [deleted] that Captain Stovall talked about is reflective of that.

Senator GOLDWATER. General Ellis or anyone of you: Because the cruise missile has just recently come into the strategic picture, has that had any effect yet on your target planning?

General ELLIS. Not as far as our JSTPS planning, Senator. When that comes about or comes down to guidance through the JCS, at that time we will come up either with a revision to our current plan or we will revise the entire plan, depending upon the massiveness of the change.

[Deleted.]

Senator GOLDWATER. The reason I raised that point, when General Slay was before us, he said it would take about two, they could modify two B–52's a month, unless we double the program, which could mean four. I raised a point that if this time were required, that we would have a period of nakedness—if that is the term—in the Strategic Air Force; Air Command, from 4 to 8 years, where we would not have a sufficient number of modified 52's to carry on the bomber portion of the target mission.

Have you thought of that?

General BURKE. We have looked at that schedule, if I can help you, and we would think in practical terms you could do that [deleted]. But as we take others down we will bring those back up and I think we can come up with an approach that would take about [deleted] at a time.

Senator GOLDWATER. Then this does not give you great concern that we would have a number of our 52's out of the fleet being modified?

General BURKE. Obviously we would rather not but I think that is the price that has to be paid for the modernization.

Senator GOLDWATER. If we are asked by our colleagues whether we should recommend four or two a month, would you prefer four a month?

General BURKE. That is quite an increase in cost.

General ELLIS. I think, Senator, we would have to look at this in detail.

Senator GOLDWATER. Could you do that and give us a horseback guess. I do not even have any idea what two a month would cost, but General Slay said they could do four a month but it would require opening a base other than Tinker.

General ELLIS. We will provide that for the record.

[The information follows:]

The cruise missile carrier modification program for the B–52G is planned to [deleted] program is the more desirable.

General BURKE. It seems to me the first question we have to have answered is how fast we are going to receive the cruise missile.

Senator GOLDWATER. I was going to ask that later on. On page 6 of General Ellis' testimony he mentioned the cruise missile concept of a large transport-type aircraft.

That brought the question to my mind, when do you think the cruise missile will be operational? I know they will fly. When do you think we will have the avionics, terrain avoidance, more detailed knowledge of the terrain that has to be avoided?

General ELLIS. To the best of my knowledge, Senator, the limiting factor will be [deleted].

Senator GOLDWATER. The limiting factor?

General ELLIS. Yes, sir.

Senator GOLDWATER. You do not have the avionics now, do you?

General ELLIS. No; but we expect to have operational missiles. But as I understand it, it is only [deleted] that we receive in 1980, then in 1981 it starts meeting our——

Senator GOLDWATER. Would you say about 5 years?

General BURKE. I have a slide that develops that a little more if you would like to see it.

Senator GOLDWATER. I do not want to interrupt your presentation but I think at this point it might be interesting.

I have spoken to various people about this and I get various answers, ranging all the way from 4 or 5 years to 10 years.

General BURKE. I don't know, sir, what the practicable production rate for cruise missiles is, and General Bratton from ERDA, I know will talk to you later about what can be done with warheads, but I just have two slides here that look at it. This one reflects a production rate of 40 a month. I do not know if that is a good figure or not.

[Slide deleted.]

It indicates that the cruise missile production would be at this production rate, a pacing factor rather than the B–52 modification it shows that you would have sufficient UE for [deleted] missiles which happens to be the number you could handle externally on the G force around about 1986 or so—somewhat later to get the [deleted] UE which would be what you could carry on the G force if you had it both internal and external.

This shows a production rate of 60 a month and again I have no knowledge if this is an attainable rate or conservative.

Senator GOLDWATER. We are really talking about 5 to 10 years then.

General ELLIS. Senator, these are just projections that we have made on production rates we have heard. The Secretary of Defense has said that we will have [deleted] missiles—I think the figure he uses is 1985. We are not familiar with how that was calculated.

Senator GOLDWATER. Is the figure 6,000 total an accurate figure or is that too high? We have heard that there would be 6,000 cruise missiles purchased.

General BURKE. I would think that number would go beyond the air-launched cruise missiles if the number is that high. I think it would

include ground-launched and submarine or sea-launched cruise missiles.

Mr. SMITH. If I may, Senator, General Slay's testimony, I think projected just on a postulated basis somewhat between [deleted] thousand, [deleted] hundred cruise missiles.

Now, if you add the [deleted] cruise missiles, which is roughly comparable to the figure on this chart, to the other weapons in the force, that would be deployed as a penetrator, continued SRAM and gravity bombs, you might get something close to the figure you might have heard.

Senator GOLDWATER. Thank you very much.

Senator MCINTYRE. If it is agreeable, Senator, we will go on a 10-minute rule.

Senator GOLDWATER. Yes.

MIXED FORCE CONCEPT

Senator MCINTYRE. I would like to begin my examination of the witnesses here this morning by taking a look at the concept of a mixed force of penetrating bombers and standoff cruise missiles carriers which you support in your statement.

General Ellis, let's begin by examining the concept of a mixed force by focusing on penetrating bombers in such a force. Now you said in your statement that "in combination, the deterrent contribution of these two elements of the bomber force—cruise missiles and penetrators—would exceed the sum of their parts." Would you and your team please list now as complete and specific a list of such synergistic advantages as you can.

General ELLIS. Senator, my statement on the force that I recommended was talking about the [deleted].

So you have a penetrating bomber as well as a launcher, a launch vehicle.

I wanted to make the record clear on that.

Senator MCINTYRE. Yes.

General ELLIS. I would like to develop some charts on this. Take a look at different force structures, Senator, which show, first of all, we have taken a look at the target base; what we anticipate the target base would be in 1985–87 time period. We have looked to see the number of weapons that are required for that force. And then we have applied certain forces to that which I think in combination will give you a feel for what those forces accomplish by the synergistic effect.

[Chart deleted.]

General BURKE. Yes, sir, I would like to have chart 31 if I could and I would like to introduce Maj. Jim Evatt, who has been working on this study. We are going to show a series of three charts which represent a distillation of what is about a 45-minute briefing which summarizes about 8 months of an analytic effort, computer modeling, we have been through, attempting to find the ideal bomber weapon loading mix.

We did this without regard to the real world, that is without regard to what carrier is available and not tied to specific air launch vehicle in that sense it is an idealized force.

Thus when you come up with this answer you have to bring that back and integrate it with the reality of the world as it exists.

Major EVATT. Yes, sir, the first thing we did in our allocation study was to establish the target data base and we selected all of those targets belonging to the [deleted]. We will give you a number in just a moment as to what the total number of targets boils down to [deleted].

We attempted then to use a [deleted].

Finally, we would match [deleted].

[Chart deleted.]

The total number as shown here, sir, was [deleted].

This is unconstrained by carrier availability, it is unconstrained by cost, it simply says to achieve the damage expectancy requirements against those [deleted] targets, that this is the number and type of weapons that we would like to have.

Senator MCINTYRE. I note that the type of weapon used is rather heavily in favor of the bomber penetrator as opposed to the cruise missile platform.

Major EVATT. Well, that is true at this point.

You can make trades between these systems but it is not the most efficient, and that was going on the assumption we would attempt to select the most efficient weapon so when we have a larger target, of course, the gravity weapon is the most efficient weapon against that target. That does not mean you could not use [deleted] cruise missiles to do the same damage if you so desired, but they would not be the most efficient application of weapons.

General ELLIS. Mr. Chairman, may I show you the comparison of the forces that we applied to this task?

Senator MCINTYRE. Yes.

General ELLIS. If I may speak to your question more precisely. On the individual characteristic of the two systems that contribute to the synergism we are talking about with regard to the ALCM, of course there is a small radar cross section. In accuracy, we are looking at [deleted] feet. And obviously it is able to reach targets that will assist the penetrator getting through at greater depth than SRAM.

With regard to the bomber, of course, you have all the advantages of a man in the system. You have the ability to recognize the threat during the course of the penetration.

You have the ability to apply your defensive weapons system as you recognize these threats. You have a damage assessment capability in terms of what has been done on the target you were coming up on. We are deep into making that a part of our overall operational practice.

Of course the target coverage is unlimited in terms of ability to reach any target within the system.

Senator MCINTYRE. Let me just ask the question a little differently. What dangers might arise if we composed the air breathing leg of the triad totally of standoff cruise missiles? What dangers could arise if we would have relied totally on penetrating bombers?

General ELLIS. I think, I may ask General Burke to help me on this. I think, Mr. Chairman, that relying completely on the standoff missile allows the Soviets to concentrate their defensive efforts against a known system without having to worry about the penetrator which

ties up tremendous resources, something on the order of [deleted] a year.

Obviously, we have a system here that has not become operational yet. As I indicated in my statement, there is much that needs to be done in terms of applying that force.

In terms of target coverage, we are not certain as to the total amount of targets we are going to be able to cover because we are not certain about the range limitations that may be introduced in the future. We are talking at the moment about [deleted] kilometers, roughly [deleted] nautical miles. To that you must apply certain factors in terms of standoff distance, operational planning factors, evasion of defense, the speed of penetration, the altitude of penetration.

Now, if you rely solely on the penetrating bombers, the reverse is true to the extent that the ALCM is going to require a tremendous expenditure of resources to counter that threat.

As you know, we believe there may be a possibility of the [deleted].

So, the synergism is in the resources that he must expend in order to counter that which in turn gives us added confidence of penetration capability.

General BURKE. If I could add a word to the last half of your question on the problems that might ensue with only a penetrating force.

In addition to the [deleted] that General Ellis addressed in his statement, there is a limited weapons carriage capability that you are committed to with those penetrating aircraft. I think, however, in general terms you can make the statement that all weapons have advantages and disadvantages, as we all know. There is no such thing as a perfect weapon. Therefore, some are more efficient against different types of targets than others and when you do an analysis of this sort, you are inevitably driven to the conclusion that there is diminishing marginal utility with any specific weapon and the right answer always comes out to be a mix.

Senator MCINTYRE. Thank you.

Mr. OLD. General Ellis, good morning to you.

When the Major was speaking of the number of weapons, the number of designated ground zeros that should be dedicated for the bomber, and he came up with a total of approximately [deleted] what was the force, what was the bomber force that he was speaking of to carry those kinds of weapons?

General BURKE. As we prefaced that, Mr. Old, that was done independently of carriers. It is an idealized selection of bomber weapons without regard to how you get them there.

Mr. OLD. OK, I am sorry I missed that. You did say that.

It is not relevant to any force structure that you may be planning on right at the moment?

General ELLIS. You would use it as a measure for determining the best force structure.

Mr. OED. OK, that has not been followed on to its conclusion. I guess we are going to pursue that at a later point.

We will take that up later.

General BURKE. We have translated that, accommodated it to the reality of the world. To my knowledge that is the first time it has been approached from that aspect. Generally, the entering premise is with a given structure of carriers and we wanted to approach it from the

view of efficiently covering the targets and then of working our way backward.

Senator GOLDWATER. General Ellis, I believe SAC was planning for a B–1 force level of 240?

General ELLIS. Yes, sir.

Senator GOLDWATER. 247?

General ELLIS. 244, I think.

General BURKE. 210 UE, Senator, 244 total buy.

Senator GOLDWATER. When that number of B–1's would be obtained, how many B–52's would have been retained?

General BURKE. Our planning which extends only through 1987 did not envision the retirement of any B–52's until 1987. It was viewed as an adequate force.

Senator GOLDWATER. What year would it be one would have achieved the initial operational capability?

General BURKE. 1982.

Senator GOLDWATER. 1982?

General BURKE. Yes, sir, we had planned on having a limited weapons capability, that is, the first squadron on [deleted]. Our IOC was geared to a larger number of aircraft, as I recall, about 65.

Senator GOLDWATER. Well, at that time what targets would it be 52 or possibly other elements of the triad?

General MILLER. [Deleted.]

Senator GOLDWATER. I would be interested to know if the B–1 had not been canceled would there have been any need for the modification of the B–52; would you have asked for it?

General BURKE. Yes; we had asked for that regardless of the B–1 decision. There are several aspects to these modifications. The electronic countermeasure modifications are a never ending process as long as we have aircraft in service and must react to changing defenses. The other modifications which are of the offensive avionics and the tail guns are largely focused on improving the reliability and maintainability of 1950 vacuum tube technology which is increasingly difficult to maintain and increasingly expensive to maintain. At the same time we will get performance improvements from these modifications, but our primary goal is maintainability and reliability.

Senator GOLDWATER. There obviously will be, in my opinion, an increased requirement for the B–52 without the B–1. If you agree with that, what increase would you judge it might be?

General ELLIS. Well, I do not think, Senator Goldwater, that we are going to get any additional B–52's. We are holding some hope that we will be provided a penetrator, a new penetrator, and as indicated in my statement, we are looking at a version of the FB–111. And our language has not reached the point yet where we have asked for specific numbers or arrived at specific numbers.

Senator GOLDWATER. Have you proceeded far enough with your thinking on this stretched B–111 to give this committee any idea what it might entail? Were you thinking just engines, fuselage, changing the wings? If you have not, or even if you have, I think we ought to have some look at that because we have not heard anything of a concrete nature that we were going to do it or that you were going to ask for it. I am interested to know what we are going to expect in the way of performance increase and cost increase.

General ELLIS. We will ask the Air Force to provide that for the record.

[The information follows:]

As we understand it, the latest proposal for the FB–111H contains many improvements over the FB–111A's in service with the Strategic Air Command today. While employing the basic FB–111A airframe, the fuselage has been stretched some [deleted]. The new aircraft would also capitalize on technology gained from the B–1 program by utilizing the General Electric F101 engine as well as some advanced offensive and defensive avionics components. This latest proposal is currently under study by HQ USAF, Air Force Systems Command as well as the SAC staff.

Senator GOLDWATER. I did not think you had.

General ELLIS. I can give you my understanding. It will be the things you are talking about, the B–1 engines, some of the B–1 avionics, defensive avionics, the stretch. They are talking about two prototypes; they are talking on the order of a $380 million program to put these together and to run a test program for evaluation.

Senator GOLDWATER. For how many aircraft?

General ELLIS. To my knowledge a force level has not been identified but the prototypes will be just for two.

Senator GOLDWATER. Could you give us that information?

General ELLIS. Yes, sir.

Senator GOLDWATER. When you have it.

General ELLIS. Yes, we certainly will.

[The information follows:]

A specific force level of FB–111H's is critically dependent on the number of cruise missiles we will eventually employ in our strategic force, our employment policy and what current systems we retain and modify. Planning factors of the B–52's, FB–111's and SRAM are well known and understood. However at this time planning factors for the proposed FB–111H and cruise missiles are highly dependent on judgments and contractor specifications on performance, survivability, penetrativity and reliability. Until more data becomes available through prototype testing, we feel it is premature to recommend a precise force level.

Senator GOLDWATER. How does the joint strategic target planning staff plan to cover these targets without the B–1 and is it possible for you to provide a bar graph chart that will illustrate the number of weapons to have been delivered with the B–1 force versus the B–52 CM force?

Admiral MCMULLEN. If I may, I will ask my "dual hatter" General Miller to respond, Senator Goldwater. As you know, the Joint Strategic Target Planning Staff are current capabilities planners. But cruise missiles are coming along very quickly [deleted].

Senator GOLDWATER. Personally, I do not feel that you are far enough along in this whole area to be as precise as we would like to be, but I would suggest, Mr. Chairman, that when their thinking begins to materialize in this field, that we could well have a hearing or a letter or something or even a bar graph to show what the CM will do in replacing gravity-weapons or other types.

[Chart deleted.]

General BURKE. We would have a chart, Senator, that does address your question. We prepared it at the request of the subcommittee staff. I will go back and talk to it a bit if I may.

This chart deals with arriving warheads, so we have factored out all weapons that were lost en route for whatever reasons. It takes a look at four forces.

Force 1 is today's force applied against today's targets and today's defense.

The remainder are all applied against [deleted] targets and defense.

Force 2 which we include at the request of the subcommittee, is what we imagine the B–1 force would have looked like, and it is included simply for comparison. Most interesting are force 3 and force 4 because those are the two alternatives that are attainable in the light of the decisions that have been taken. Force 3 tends to stress [deleted].

[Deleted.]

General BURKE. Having said that, however, let me quickly say that these attainable forces are quite superior in comparison to today's forces against today's targets. So these are representative of what can be done within the light of the decision not to produce the B–1, and we express it in three measures of merit: Arriving weapons, arriving equivalent megatonnage which, as you know, is a standard measure of merit for dealing with soft area targets, arriving counter military potential, a measure of merit for dealing with hard point targets.

These are the results that come out. As you can see, this analysis would favor [deleted].

Mr. OLD. General Burke, just for the record, would you please explain what those two abbreviations stand for?

General BURKE. EMT is equivalent megatonnage which is the standard measurement used to describe the efficacy of a weapon system against soft area targets.

Counter military potential, CMP is the standard measure of merit used to describe the efficacy of a weapon system against a hardened point target.

Senator GOLDWATER. Thank you. I have exceeded my time.

Senator MCINTYRE. What does CMP stand for?

General BURKE. Counter military potential. That is for the hard target.

Senator MCINTYRE. I would like to address the question I originally asked General Ellis to get the viewpoint of General Larson and General Miller and then General Enney.

General Ellis, in his statement in referring to the mixed force here, said and I quote again, "in combination, the deterrent contribution of these two elements of the bomber force—cruise missiles and penetrators—would exceed the sum of their parts."

In addition to what General Ellis is saying, can you add anything, General Larson?

General LARSON. Well, the penetrability of the Soviet defense is a very complex subject. [Deleted.]

In addition, we know that presently we do not have ECM capability for cruise missiles. Possibly a following generation of cruise missiles will have that. But in the meantime we do have an ECM capability of the manned penetrator. [Deleted.]

Senator MCINTYRE. General Enney.

General ENNEY. I have nothing to add to that which has already been covered.

Senator McINTYRE. Any other witnesses wish to add anything to this, I think, important point?

Mr. SMITH. General Larson, we have been told by some of the [deleted].

Is that a logical line of reasoning for the committee to consider, and if so, would that not compound the Soviet's defensive problems unduly?

General LARSON. The question as I understand it is that [deleted].

Senator McINTYRE. You can comment on that for the record.

General LARSON. All right.

Mr. SMITH. Thank you very much.

[The information follows:]

Compressed reaction time compounds the defensive problem against very low altitude penetrators of any type, whether bombers or cruise missiles. When one considers the question of keeping [deleted].

Senator McINTYRE. I would like to ask General Ellis, are there any disadvantages of a mixed force, penetrators, and standoff? Are there any disadvantages to this type of force?

General BURKE. The only disadvantage that comes to my mind is that a mixed force in all probability would cost more than a single element force.

General MILLER. I think, before you consider standoff, you have to ask yourself how many are we considering standoff and how many are we considering penetrators and is the cruise missile far enough along in its development now in order to designate a certain percentage of the force for a standoff role, or should we maintain the capability to penetrate as we develop the cruise missiles?

Senator McINTYRE. General Ellis, in your statement you say the B–52 G's and H's will be airworthy until the late 1900's. I assume then the critical issue is their survivability against Soviet defenses. What had been the history of SAC's estimates of B–52's probability to penetrate in recent years?

General ELLIS. We checked when we came up with our [deleted] percent figure for 1977, we checked 10 years ago as to our ability today to penetrate and we were [deleted] points off of what we calculate to penetrate today.

Senator McINTYRE. You have high confidence in these figures?

General ELLIS. I have good confidence in them, yes, sir.

Senator McINTYRE. What has SAC done to maintain this [deleted]. Historically, what have you done that gives us an assurance of [deleted] percent?

General BURKE. We have, with the support of the Congress, evolved the weapon systems. We frequently talk of the B–52's age and it is not a new airplane. But it is an altogether different airplane than was procured back in the 1950's. We have added major systems to it. Foremost among these I think, to enhance its survivability, was the short range attack missile. The SRAM was a marvelous addition to our force. To a large measure it minimized the problems of terminal defense, [deleted]. That has done more than anything else, I think to keep our probability to penetrate up.

Secondly, we have installed the electro-optical viewing system, which is a low light television and forward looking infrared camera which

allows us to penetrate at the even lower altitudes than we have in the past.

In a SIOP situation it would be necessary to fly the B–52 [deleted].

[Deleted.]

The third improvement and one that is never ending is that of electronic countermeasures. We are just completing the installation of what we call Phase VI ECM for the B–52 which is our sixth upgrade of the system to take advantage of what we learned in Vietnam [deleted].

Additionally, tactics have been changed in response to changing circumstances.

Senator McIntyre. What was the probability of penetration of the B–52 last year?

General Miller. In the SIOP, sir, we calculate the probability to arrive at a poststrike base for each and every sortie. We can generalize and come up with an overall average and for the SIOP, for the current SIOP that was about [deleted] percent. That changes as the defense changes and we react to those defensive changes.

Mr. Smith. I thought that out at SAC you had either projected a higher future figure or demonstrated the [deleted] was a higher figure than the one before.

General Miller. I am sorry, Senator McIntyre, the current SIOP is [deleted]. The new SIOP we are working on that will come into effect October 1 for the first laydown will indicate that we will have a [deleted] which is an improvement somewhat. Now there obviously have been no great improvements made in the weapon systems since we did the 5 Alpha and 5 Bravo, so what we are really showing is the reflection of different kinds of planning. We are taking advantage of the three things that are absolute when you must put your bombers into an enemy target structure. That is avoid, suppress or destroy.

General Burke indicated how we take advantage of those three things.

Senator McIntyre. General Ellis, what are the most troubling and challenging elements of a future Soviet air defense which would stress the B–52's in the late 1980's?

General Ellis. [Deleted.]

Senator McIntyre. General Larson, do you have anything to add to that?

General Larson. Those are the three things that we are watching most closely.

[Deleted.]

Those are the three principal threats we are watching.

General Burke. If I could add two points. One is as General Ellis mentioned, [deleted] and clearly they are capable of doing that in that time period.

But clearly they cannot do it inexpensively. Those are multibillion-dollar programs.

Mr. Smith. That is a worst-case situation, isn't it?

General Burke. Yes, sir.

General Ellis. Yes, very conservative.

Mr. Smith. You still have what was it, [deleted].

General ELLIS. [Deleted.]
General BURKE. [Deleted.]
Mr. SMITH. [Deleted.]
General BURKE. Yes, sir.

Senator GOLDWATER. General Ellis, it appears the mideighty manned portion of our strategic force will consist of some B–52 penetrators and some B–52 missile carriers along with some B–111's. I, for one, refuse to use F in connection with that bomber.

Assuming that the force is similar to that and that the guidance remains very similar to what it is today, can the level of destruction required in the guidance be achieved?

General ELLIS. We think it can, Senator. If you refer back to the series of charts that you saw where [deleted].

Now, the addition of the B–111 as you indicate would certainly contribute to that because its penetration capability which as was noted, I think, in my statement would be up in the [deleted] in that time period.

Senator GOLDWATER. Getting back to the part of your statement where you forecast the use of the KC–135, you did not mention any need that you see for a new one such as we talk a bit about, a cargo tanker type from the 747, DC–10 or 1011.

In view of the fact that many of the KC–135's are now going into the National Guard, don't you feel that you are going to need a more modern tanker?

General ELLIS. We think, Senator, that the ATCA basically would support the tactical and an airlift force. Certainly it can contribute to the strategic force. But given the force level of tankers we have today, if we are able to maintain it, if it is kept modernized—by that I mean the re-skinning and re-engining, we think we have a viable force that will be adequate to meet our requirements, but we see very little possibility of any reduction.

Senator GOLDWATER. The cargo tanker would be more valuable for TAC——

General ELLIS. Yes, and for MAC.

General BURKE. We really addressed the strategic portion of the problem today, Senator Goldwater, and the ATCA is being procured as part of the general purpose force structure. It is not necessary for refueling of the strategic bomber force, but it makes a magnificent contribution both to MAC, C–5's and C–141's if they become refuelable and for the deployment of tactical fighters particularly at long distance. Where en-route basing is questionable in fact it enables us to do things you simply cannot do no matter how many 135's you employ because the 135's themselves don't have that range. But for the strategic forces. KC–135's do a superb job now and will continue to do so. We see no diminution of that.

I might just add that transfer of 128 KC–135's to the Reserve Forces, including 8 to Sky Harbor, in no way decreases the utility of the airplanes, that is, they are still there, still available as part of the force concept.

Senator GOLDWATER. We were talking about airplanes, General Ellis; has SAC prepared or been asked to prepare ROC for the wide bodied cruise missile carrier that we hear suggested from time to time,

not suggested by the Air Force, but we hear suggestions involving the 747 short version or the 1011?

General ELLIS. Not to my knowledge. May I confirm that?

General BURKE. Specifically; no, sir.

No one has asked us to prepare such a ROC nor have we prepared such a ROC.

We are studying at the present time such a requirement and what sort of contribution that type of a carrier would make and it may well be possible that a ROC will be developed but it has not been at this time.

Senator GOLDWATER. Do you honestly believe that such an aircraft would make a viable weapon system? Would it not present a very easy target to destroy?

General ELLIS. Senator, may I speak to that first and then my staff can amplify.

We have done a lot of work on the cruise missile at SAC but we are really in the horse-and-buggy day in terms of our planning and the application of this weapon system.

We have an intensive effort underway and it will be a continuing thing with the best brains that we have in SAC.

This is one of the options we are going to be looking at. It has obvious advantages that I mentioned because of its economy. We will have to equate the present threat and possible developing threat against that. We will have to look at the synergism of penetrating bombers and a few of the cruise carriers such as you described in that or in the overall envelope that the Soviets must deal with. I think we will find there is a synergism, that is, a certain number of them may be and should be viable and desirable.

I would like to add one other point. It depends again on how they are counted and the range limitations that may be placed on the cruise missile development.

Senator GOLDWATER. What was the role of SAC in the selection of the items submitted in the supplemental budget request.

General ELLIS. There were discussions at the staff level between the Air Staff and the SAC Staff. We did not see the supplemental in its entirety prior to its being forwarded.

Senator GOLDWATER. You were not there when that was prepared, were you?

General ELLIS. No; that is right.

General BURKE. That is correct and that is the norm. We as an operating command do not ordinarily deal directly with the people who are preparing budget submissions.

We work with the Air Staff who have that interface.

Senator GOLDWATER. Do you think it would be better if you were more deeply involved in it?

General ELLIS. Our input from SAC, Senator, as you know, is through channels, through the JCS planning process and through the Air Staff.

There is constant flow of information back and forth between these agencies. It would be interesting to see exactly what comes from our recommendations before the fact, but it certainly is not mandatory.

General BURKE. I might add, Secretary Brown has just instituted a policy shortly after he took office to provide a more direct communica-

tion between his unified and specified commanders in chief and himself. He invites each to send him a quarterly report of his views of whatever subjects he thinks relevant, and specifically to provide an annual submission as to his views in regard to research and development. I think this will provide a useful channel.

Mr. OLD. General Miller, we were speaking a moment ago about the weapons and how you would attack various targets, and I believe you indicate you would send the cruise missile against the lesser defended target. Did I quote you correctly on that?

General MILLER. Yes, sir.

Mr. OLD. Is that a general consensus in SAC at the moment as to how the cruise missile would be deployed, or have you been able to come to any sort of conclusion?

General MILLER. Those are the kinds of targets we are looking at specifically, because, as I point out, you can attack defended targets if you so desire or if you have to, but you have to anticipate that you will in fact lose some of the cruise missiles in doing that. It is not a very efficient use of weapons to go after a highly defended target with an undefended weapon system.

Mr. OLD. The penetrator then would be reserved for the tougher targets, so to speak.

General MILLER. The penetrator with a standoff weapon such as SRAM.

General ELLIS. Let me amplify that.

As we know and understand the ALCM today, I think certain technology is coming down the road, that will greatly assist the ALCM in the penetrating role and we look forward to additional details on that.

Mr. OLD. I thank you.

I raise this point because Secretary Brown in his statement stated the cruise missile is clearly going to be more penetrable over long distances than the large manned aircraft. That is why this seems to me a better and not merely a less expensive way to go.

Do you interpret Secretary Brown's statement as being more directed toward standoff missile shooter concept? It seems there is a bit of a conflict here. The command seems to be indicating that it has more of a capability to penetrate, that is the front system, whereas the Department of Defense or OSD's position seems to be more of a penetration was kind of against the lesser defended targets and we would, in fact, use the cruise missiles against the more highly defended targets. Can you speak to that?

General MILLER. As I understand the Secretary's statement, sir, he indicated that we would continue to have a manned pentrating bomber force in addition to standoff missiles. How those weapons will be employed we cannot really say yet because as we indicated earlier, we are just beginning to investigate the target system now to determine where they will be used, and I gave you my best guess. I anticipate that the most efficient use at least for now would be against those lesser defended targets.

Mr. OLD. Is it fair for us to conclude here today that the employment plan of each of the new systems projected to be in the inventory in the mid-1980's has not been definitized. You have not decided fully how you want to deploy that force?

General Ellis. Mr. Old, as I tried to indicate a little earlier there, we are not at the state and detail in our planning that we can precisely say how we will lay this force down. We have ideas, there are many things that are being tried out, but we would like to reserve on that until we are able to get into it a little bit more.

Mr. Old. Certainly a major requirement for the B–1, in addition to replacing the aging B–52 force, was the need for an advanced penetrator to assure that you could carry out the SIOP mission. Now that the B–1 is not going to be here, there is going to be more dependence on cruise missiles. Is the decision going to be against these targets with cruise missiles and/or are you going to try to make do with the B–52 as a penetrator?

General Ellis. I believe that we should state that we are going to use a mixed force of cruise missiles and penetration bombers with a hope that we will have a modification modernization of the penetrator in terms of not only upgrading the B–52, but in terms of a possible version of the B–111.

Mr. Old. So the command still sees the need for a penetrator?

General Ellis. Absolutely throughout the time period.

Senator McIntyre. General, is there a next generation of technical modifications of the B–52, beyond those you mention in your statement, which would effectively counter these Soviet defenses improvements?

General Burke. I wouldn't refer to it as a generation, Senator. I think what is needed is a steady evolution of the electronic countermeasures equipment aboard the aircraft. The other modifications proposed to the offensive avionics and to the guns we would think would be one-time investments. But we would expect to continue to modernize the ECM as long as the aircraft is in service.

General Ellis. You may be referring, Senator, to the B–52X which SAC has looked at over the years as well as other Defense Department agencies, and in our opinion, we have given the FB–111 the nod. I think that would be what you would call a next generation B–52.

Senator McIntyre. That FB–111, if it goes, if it makes sense, would that be a true startup?

General Ellis. There are several options there. There is the option of modifying the FB–111A, the option of production, the option of a combination of the two.

Senator McIntyre. F–111 is a fighter type, FB–111 is the bomber version. Is the F–111 open to conversion into a stretched situation? Can it be made into a penetrating bomber?

General Ellis. The fighter is the same basic airframe but there is no intention of doing that.

Senator McIntyre. All right.

General Larson, as General Burke has said, on the ECM, we have been trying to evaluate the widely conflicting opinions on bomber ECM effectiveness in the mid- and late-1980's. Two questions: (a) What analytic approach would you suggest the committee might use to assess this controversy objectively, and (b) what is your best judgment regarding the substances of the issue?

That is the widely conflicting opinions on bomber ECM effectiveness.

[Slides deleted.]

General LARSON. I think that we have quite a bit of empirical data that we use and provide to the JSTPS on the effectiveness of ECM against various threat systems. I have two slides that talk specifically to the probability to kill of a B–52 [deleted].

However, I would point out that, historically, the ECM capability onboard the penetrating aircraft has been able to achieve an [deleted] to a B–52 with an ECM capability.

General BURKE. I might add, Senator, that you asked about the analytic foundation to support these arguments. About 6 years ago, we, at SAC, embarked on an extensive year-long study of potential modifications and improvements to the electronic countermeasure suite.

Senator MCINTYRE. Excuse me for a moment, General Burke. My thought is we would recess at 12 o'clock and come back at 1:30—is that all right with you?

General ELLIS. Yes, sir.

General BURKE. I was going to make the point we did a long, long study 6 or 7 years ago, the product of which was the current modifications to the B–52 ECM suite which we call phase VI. Just a few days ago, we embarked upon another study which we expect will take us about a year, in which we are looking at all the proposed alternatives for electronic countermeasures and through simulation modeling, we are attempting to determine the incremental improvement that each would add to the penetrativity of the bomber force and determine if they are worth the money.

Senator MCINTYRE. General Ellis, your statement estimates that the probability of B–52 penetration in 1987 is substantially improved by our shift to mixed force with standoff cruise missiles. Would you explain the basis for this estimate?

General ELLIS. I think our B–1 force with the B–1's in the force, our penetration capability was [deleted] percent. I am saying that we would just about come back up to that level we believe on the basis of preliminary calculations.

Mr. SMITH. Is that with the B–52? In the B–52 and B–1 force, the synergistic effect is raising survivability of the B–52 to [deleted].

General ELLIS. Exactly.

Senator MCINTYRE. Do you have estimates on the effect of the B–1 with added cruise missile?

General BURKE. We have not done that calculation—no.

Senator MCINTYRE. Could you try to give us a rough figure on that for Senator Goldwater's benefit?

General BURKE. Yes, sir, we would be happy to submit that for the record.

[The information follows:]

As previously noted in the testimony, 210 B–1s would reinforce the B–52's probability to penetrate to about [deleted] in 1987, as opposed to our expectation around [deleted] for the B–52 alone. We estimate a large number of cruise missiles on the order [deleted] to achieve similar reinforcement for the B–52's probability of penetration. The B–52 in concert with both cruise missiles and B–1s would reap further benefits from this synergistic effect beyond that contributed independently by either additional force. We estimate the probability of penetration for the B–52 with additional forces of B–1s and cruise missiles to be in the neighborhood of [deleted] or better. This is an aggregate estimate

using the same assumptions underlying the previously discussed estimates of B–52 penetrativity. A more precise estimate must be deferred until numerous uncertainties are resolved, such as: How well the cruise missile can penetrate; and how would a force of B–52s, B–1s and cruise missiles be preferentially and selectively routed and targeted to maximize the potential contributions of each system while minimizing risk to the manned penetrating force.

Senator McIntyre. Here is an easy question for you.

Why do you feel that the re-engining and re-winging of the B–52's would not be cost-effective? This is the D.

General Ellis. We are talking about the force.

Senator McIntyre. The force, itself.

General Ellis. Yes. I am going to look to staff on that one.

General Burke. It would be a very expensive proposition approaching the cost of a new airplane and the return on the investment we do not think would be worth costs of that magnitude. Additionally, it would require a substantial percentage of the force be out of service, off the line, off alert, for substantial periods of time while you were doing that. So you would have to give up some of today's capability—quite a bit of today's capability—to get that improvement in the future.

Senator McIntyre. It seems to me that when you talk about the stretched version of the FB–111, which is actually the best penetrator you have, that you are going to have to look at that situation, too. You cannot modernize those without taking them off the line, either.

General Ellis. One of the options was production, new production.

Senator McIntyre. New production?

General Ellis. One option.

Senator McIntyre. OK. And you have compared that. You said the cost would be very great on the B–52 new winging, new engining. You compared that with the cost of a new FB–111, I think they referred to it; FB–111H is more favorable in cost.

General Burke. I think it, the FB–111H would cost somewhat more than B–52X modification but it would produce a great deal more force and effectiveness.

General Ellis. I think we can provide a more precise answer for the record.

[The information follows:]

A detailed analysis of a mixed force of FB–111Hs operating with penetrating B–52s and cruise missiles has not been conducted. FB–111Hs operating in a mixed force are expected to be more effective than in previous comparisons. The FB–111 would not match the B–52X range payload characteristics; however, better penetration characteristics, higher pre-launch survivability, equivalent reliability, and weapon load adjustments could provide greater FB–111H effectiveness for the cost than the B–52X.

Senator McIntyre. Let me amplify it with the next question.

General, I believe SAC has gone on record for research and development is fiscal year 1978 for the FB–111H. What is the general outline and objective of the FB–111H program from SAC's point of view? The latest report is that AF has recommended to SecDef $90 million in fiscal year 1978 for two prototype FB–111H's to be modified with the B–1 engines and "stretched." Likely funding method appears to be "reprograming" of B–1 R. & D. but will have "new start" problem.

You can answer that for the record as you want to.

General Ellis. Yes, sir.

[The information follows:]

The FB–111H proposal, as we understand it, would consist of two modified FB–111As, as prototype aircraft, with options to produce new FB–111Hs as well as modifying the current FB–111As. Based on a FY 78 start of the prototype program, delivery of the first FB–111H would be in [deleted].

The role of the penetrating bomber in the strategic mission has been well documented. Addition of the cruise missile to the strategic arsenal complements today's manned bomber force while compounding the enemy defensive problem. but in no way does it obviate the role of the penetrating bomber.

The FB–111H, which offers the potential for an effective manned penetrating bomber into the 1990s, provides a hedge against cruise missile and Strategic Arms Limitation Agreements as well as any unforeseen problems with the B–52 force.

The FB–111H with its improved payload, range and avionics capabilities could make a significant contribution to the flexibility of the strategic bomber force.

Senator McIntyre. I think we will take a break here now if it is all right, and come back at 1:30.

[Whereupon, at 12 noon the subcommittee recessed to reconvene at 1:30 p.m.]

AFTERNOON SESSION

Senator McIntyre. It is my understanding we left off on a general question on the movement toward the FB–111H. It is a little speculative. We asked what is the general outline and objective of the FB–111H program from SAC's point of view. I might be interested in hearing your point of view. What do you think it will achieve if this comes about?

General Ellis. This is one of the options that we are looking at at the moment. It is the only one that SAC is looking at in terms of the options the President asked for in his B–1 decision.

That option, of course, is to maintain an option for development of a penetrator if circumstances warrant.

At this point in our thinking we haven't gotten far enough into the program to understand force numbers. We only want to look at feasibility and, of course, you understand this is something that we in the blue suit are talking and it is certainly not the Department of Defense program at this time, and we'd have to convince them first.

Senator McIntyre. It would be better to ask the questions of Dr. Perry later. I am sure by now he must have given some thought to it.

Mr. Smith. There seems to be a little bit of a problem here. I don't think I can put my finger on it exactly. In one of the prepared answers to one of the prepared questions, Dr. Perry indicates that the FB–111 is basically an Air Force problem and that OSD would be favorably disposed if the Air Force defined the program which they wish to recommend.

Senator McIntyre. Let me ask you a question. There is no line item in the supplement that talks about the FB–111H?

Mr. Smith. No; although we have heard substantial rumors that within a matter of days the Department may wish to revise the request for roughly $90 million for a FB–111 development program. This raises a question to ask SAC.

If you had your choice, would you prefer to have $90 million devoted to the FB–111 for a development program as a startup, or would

you prefer to keep that $90 million in B–1 R. & D. effort, if that were the choice?

General ELLIS. This is a personal——

Mr. SMITH. Yes.

General ELLIS. A personal answer, Mr. Smith.

I would think that in light of the present decision, using it on the FB option, would lead to something that is certainly more attainable if the tests work out and would be more acceptable to our bosses than trying to revitalize the B–1 program.

Mr. SMITH. A similar question, General. From your vantage point, what is the utility of devoting $90 million in R. & D. to the FB–111 development compared to devoting $90 million to a wide bodied cruise missile carrier development. How do those compare from your view?

General ELLIS. That is a difficult question. In one case we have new technology and program that we are just starting out on. It is something we should look at, with regard to the penetrator it is something that is another option that has been requested. I think that I would want to say I would have to dig into that one a little bit more.

Mr. SMITH. It may make it a little easier if the rumors that we have heard prove to be true that in addition to the revision which would add $90 million for a FB–111 development that there might also be a reduction of the $90 million for cruise missile carrier by $40 million. That might make the choice a little clearer.

General ELLIS. I would only be speculating at this point.

Mr. SMITH. I appreciate that.

Senator MCINTYRE. Thinking about a wide-bodied cruise missile carrier, General, what modifications do you feel such a plane would need to make it a militarily viable cruise missile carrier? Would it need ECM for example?

Mr. SMITH. The Department has described a number of alternative wide-bodied jets from the commercial.

Senator MCINTYRE. 747?

Mr. SMITH. Yes; they would fly at some indeterminate point off the Soviet land mass and unleash large numbers of cruise missiles.

Senator MCINTYRE. Then the question is what modifications do you feel such a plane would need to make it militarily viable, what about ECM?

General ELLIS. There would certainly need to be some sort of—I am speaking in the absence of any detailed studies on this, Mr. Chairman—it would need some type of threat warning indicator, either internally or with the assistance of one of our AWACS aircraft, or some other sensor system.

It would seem best tactically to employ it [deleted].

This Congress, I think, has voted money in the past for the ASALM. It is possible that that missile in the air defense mode should be considered as a part of that weapon system. That is the advanced strategic air launched missile. It is the one that we are talking about with an air-to-air capability and air-to-ground capability.

Senator MCINTYRE. Do you want to add anything?

General BURKE. I could add just a bit. In addition to I think an obvious requirement for electronic countermeasures to protect a system of that value, some basic constituents of standoff cruise missile carrier

would be a suite of offensive avionics to a level beyond that found in commercial airlines. You would need a navigational capability of more accuracy than is required simply to navigate from New York to London. That would argue for a highly precise inertial navigation system.

Further, you would need some method of air alining the inertial navigation system which would indicate perhaps a radar system capable of providing that input to the inertial navigation system.

You would need a launching mechanism, some device to get the missiles out of the airplane properly positioned. You need the various command control links between the mother ship and the cruise missile to provide for retargeting if you desire, that sort of thing.

And finally to the level that you could get it, you would want it nuclear hardened, EMP hardened. You would want it faster reacting than commercial aircraft.

Those are some of the things, certainly not all of them.

Senator McIntyre. Does the stacking of a large number of weapons in a single plane raise potential conflicts with SAC operational specifications for weapons handling?

General Ellis. By as many as [deleted] as we understand it.

Mr. Smith. Such things as possible radiation effects on the crew from that number of weapons in a single place. Such things as a SAC spec that requires the weapon to be unloaded within a very short time and selectively, so you could pull one out if there is a problem and get rid of it.

General Ellis. I think we should provide that for the record.

[The information follows:]

The question addresses wide body cruise missile carrier operations involving approximately [deleted] missiles per aircraft. SAC handling operations with nuclear weapons are governed by Air Force explosive safety and joint service nuclear safety criteria. Naturally, we would adopt practices that insure a smooth operation (transferring missiles from aircraft to aircraft or from weapons storage area to the alert area), but these will all be governed by existing criteria. We do not anticipate any conflicts with that criteria either in handling or storing the weapons.

In regard to Mr. Smith's comments, given the test equipment in development for cruise missiles, there will be [deleted]. In SAC, we have time lines for accomplishing maintenance tasks such as upload/download or removal and replacement of weapons, etc. Such time lines are used in planning all maintenance tasks. Since this will be a new system, there are [deleted].

Senator McIntyre. General Ellis, once we accept the validity of a mixed force, the practical focus of our decisionmaking should be to define the most effective mix of penetrators and cruise missile carriers. What criteria would you suggest as a basis to evaluate alternative mixes?

General Ellis. I think in my statement on page 6, I listed the elements, the criteria that we used in coming up with the force structure that we recommend. Certainly there are other considerations perhaps but at the moment I would like to rest on those.

Senator McIntyre. Since the B–52's are the primary aircraft to be used in the mix both to penetrate and to carry standoff cruise missiles, let's look at alternative ways of using these in a mixed force.

General Ellis, you suggest one alternative in your statement on pages 6 and 7. What other alternatives are serious candidates in the Depart-

ment's discussions at this point? Could you discuss the advantages and disadvantages of each of these altternatives?

General ELLIS. When you say the department, are you talking about the Department of the Air Force or the Department of Defense?

Senator MCINTYRE. Department of Defense, I think, DOD.

General ELLIS. The only one that I am familiar with would be the No. 3 force of the four forces we showed on the chart earlier. We can pull that out if you would like to look at it again.

Mr. SMITH. It might be useful to focus on that now.

General BURKE. That shows the end results. It might be helpful to look first at how those two forces are loaded and I might also say before we leave the point that a number of other variations were looked at during the past 2 months, but these two seem to have the most prominence and the most support.

[Slide deleted.]

Let's have slide 37. This is what the result is, but I show you how you would load those two forces. This is the force that emphasizes [deleted].

And a substantial number of cruise missiles. If there are no questions on that.

Mr. SMITH. Do you have a comparable chart for force 4?

[Slide deleted.]

General BURKE. Yes, I do, and it is slide 38.

This force [deleted].

[Deleted.]

We made this analysis before the decision was taken on the cancellation of an ALCM–A, and this force envisioned [deleted] ALCM–A's additive to the [deleted] extended range cruise missiles.

ALCM–A may no longer be feasible. However, the force is not critically dependent upon that. It fully loads the existing bombers and takes maximum advantage of the carriage capability which we have available to us. If the short range or ALCM's are not available the alternative would be to load the force with some other device that was compatible with the existing SRAM rotary launchers.

Mr. SMITH. General, without quibbling about language, you mentioned before the decision was made to cancel the ALCM–A. The current congressional directive requires that the ALCM–A lead in the development.

General BURKE. You are absolutely correct.

Mr. SMITH. On the previous chart do you have the same number of [deleted] in the force?

General BURKE. [Deleted.]

Senator MCINTYRE. Compare the advantages and disadvantages of using the B–52D's as standoff cruise missile carriers [deleted].

General ELLIS. I would like General Miller to talk in a moment about the way we use them today, the kind of targets.

Mr. SMITH. The D's?

General ELLIS. Yes; and the kinds of targets they are scheduled to penetrate against.

The modification costs required for the D's to upgrade them to a point equal to the G's and H's—plus a cruise missile carriage capability—would be very high. Additionally, the requirement for main-

taining a capability for conventional heavy bombardment is very much alive.

[Deleted.]

In addition to that, of course, you questioned the utility of them in the conventional role. Those D models have been modified with what we call the big belly mod which enables them to carry 108 conventional bombs. Those are the only B–52's we have in the inventory that have that bomb carrying capability. The G and H models, could carry as many as 27. We currently have the D models tasked to support conventional contingencies in both the bombing and in a mine-laying role. They operate in support of the Navy in laying mines and in support of both the forces in Europe and the forces in the Pacific in a conventional bombing mode.

Senator McIntyre. Let's see if I understand. That is their present role that you are talking about?

General Miller. Yes.

Senator McIntyre. Less defended areas, and they are classed as penetrators, is that right?

General Miller. Yes.

Senator McIntyre. Do you envision an improvement to the D's? I understand that will make them equal to or even better than G and H.

General Ellis. No, in our 87 computations I told you in my statement that the D's faired [deleted] and I just checked and they came out at [deleted] percent as opposed to [deleted] that is, against these less defended areas that General Miller spoke to.

Mr. Smith. General Slay, in earlier testimony, suggested one heavily caveated, postulated force which would have used 75 D's with 20 cruise missiles each as a standoff force. General Slay made it clear that the postulated force was defined very quickly for illustration really at the request of the committee. So I'm not suggesting that it was something he stood by over time. Still, could you comment on the idea of using the D's in a standoff role. What price you would have to pay, and what might you gain as a result?

General Ellis. I think the plus is it would allow you to keep the rest of the force if desired as penetrators as well as launch platforms. You have got 80 or 90 in the force which would be a sizable standoff force. The minus is the high cost—I would have to provide you the cost for the record—to bring it up to the standard of G and H, and then for all practical purpose loss of conventional capability.

[Additional information follows:]

Based on preliminary analysis, modifications necessary to deploy the 80 (75 UE) Pacer Plank-modified B–52D's (structural life extension modification to wing/fuselage) as a standoff cruise missile force include:

Offensive avionics update;

External pylons and associated wing modification internal launchers;

Aircraft Group A Equipment (wiring, brackets, etc.); and

Electrical/Hydraulic Update.

Total cost (fiscal year 1977 dollars): $511.5 million ($468.0 million production; $43.5 million R.D.T. & E.[1]).

Mr. Smith. Would one of the pluses be that you would no longer have to put that D against a less difficult defense only to come up with the survivability figure I mentioned?

[1] Assumes majority of R.D.T. & E. effort accomplished on the B–52G.

General ELLIS. I would think as we got later into the period it would become an increasingly good option.

Mr. SMITH. In sum, you have a force 3 and force 4. There could be a force 5, as it were, with a different mix of using the B–52's. In this case the D might, as General Slay postulated, be used as a standoff.

General ELLIS. That could be an option. We didn't look at that one.

Senator MCINTYRE. What modifications would have to be done to the B–52's in order to carry these missiles, the cruise missiles? For the record.

General ELLIS. Thank you.

[The information follows:]

To modify the present B–52G force for cruise missile employment would require that the offensive avionics be updated with the Offensive Avionics System (OAS) currently planned. In addition, the B–52G force would require cruise missile carrier aircraft equipment, external pylons for underwing carriage, and Group A aircraft equipment (wiring, brackets, etc.). Internal carriage of the extended range cruise missile would require modification (lengthening) of the present rotary launcher or acquisition of a new longer launcher. The 80 (75 UE) Pacer Plank modified B–52D's are not currently equipped with any carrier aircraft equipment for missile carriage-launch and would therefore require all new such equipment in addition to those items necessary for the B–52G. Any B–52 employed as a cruise missile carrier would require dual intertial navigation platforms to insure the high reliability essential to such a weapon system.

Mr. OLD. Referring still to the chairman's questions on the D in carrying the cruise missile, is there anything in the supplemental request that affects that decision one way or the other, as far as you are aware?

General BURKE. Not to my understanding. There is some money in the supplemental that relates to improvements in the D, primarily in the offensive avionics. Again it is largely a reliability and maintainability improvement. The D, of course, is the oldest, and we are having rather substantial problems in maintaining the vacuum tube technology, and that is the thrust of that effort.

Mr. OLD. Those improvements would be required whether you used the D for a cruise missile carrier or not?

General BURKE. That is correct; and they were studied and proposed sometime before the D was viewed as a cruise missile carrier candidate.

Mr. OLD. General Ellis, why is it though in this discussion the command seems to favor using the G as the carrier rather than the D? Is it because the G is a better penetrator? Do you want to get closer or go against tougher targets?

General ELLIS. Well, I will ask General Burke to respond specifically. But as a newcomer to this problem it maintains all of those advantages I listed earlier in terms of penetrator and in areas where you could use it you have a conventional capability. You avoid at large costs, while at the same time providing a penetrator that does carry a force of [deleted] cruise missiles very effectively.

General BURKE. Just a word in addition to what General Ellis said. You put your finger on a pretty delicately balanced question, and we have had some very spirited questions on this at SAC, and there are people who have different views on it. I think it hinges primarily on the utility you see in the B–52 in the nonnuclear conventional role, and

if that looms large in your mind you tend to go with the G as a cruise missile carrier and if you discount that you tend to use the D.

General MILLER. I would add to that also I think the [deleted].

Mr. OLD. In a way it would be a waste to have the G deliver a weapon to a target that a D could deliver. It would be better to take your G and run it against the tougher target.

General MILLER. Basically that is true, yes, sir.

Mr. OLD. To just kind of wrap up this point, General Burke, on the last slide that you had relative to force 4, it shows the weapon loading. Were the [deleted] mentioned in General Ellis' statement included in those totals?

General BURKE. Yes; that did include the [deleted] which at the time we did the study we were thinking in terms of [deleted] but that certainly is not the only alternative.

Mr. OLD. And these [deleted].

General BURKE. That is precisely the objective to fully load the force that you have available.

Mr. OLD. This was a shortfall or a deficit that is unrelated to the B–1 decision. This is something that has existed?

General MILLER. There are approximately 200 SRAM usable launchers. Each of those SRAM launchers carries eight SRAM or comparable type weapons. We have a total of 151 G model penetrators and 90 H model penetrators which are capable of carrying SRAM launchers. That gives you 241, so there are 41 aircraft, approximately, that do not have SRAM launchers on board. We could in fact build additional SRAM launchers to load in those bomb bays or carry gravity-dropped weapons in there, but the current load, the average load for a SIOP equipped bomber consists of [deleted].

Now that leaves us [deleted]. Those [deleted] that General Burke is referring to would be used to [deleted].

Mr. OLD. In this case it would have to be a SRAM or ALCM.

General MILLER. It can be anything that would fit the launcher or the——

Mr. OLD. A gravity weapon wouldn't fit that, I take it.

General BURKE. We think so. We envisioned the B–77 going on the B–1 rotary launcher, and we haven't explored this in depth, but I would think the B–77 and B–61 could probably be modified to fit the SRAM rotary launcher. And the fourth alternative would be the ASALM.

Mr. OLD. So the alternatives would be ALCM, SRAM, B–77, ASALM. What other alternatives could you come up with re internal carriage of weapons on a bomber aircraft? Is there anything else if you are [deleted].

General BURKE. Perhaps a B–61 instead of B–77.

Mr. OLD. OK, thank you.

I have a couple of other questions relative to the modernization of the strategic bomber force study.

General Ellis, are you or the command familiar with that particular study or title?

General ELLIS. Yes; we are familiar with it. I saw it for the first time last week. I have had a chance to skim through it. I have not studied it in detail.

Mr. OLD. Did the command participate in any way in the preparation of that document, providing any inputs?

General BURKE. I can speak for General Ellis who wasn't there at the time this was going on. We were not direct participants in it. The Air Force was represented by Brig. Gen. Emil Block, and we had constant communication with General Block and provided him support and assistance as he requested.

Mr. OLD. Does that mean that you are satisfied that you were adequately represented or the command operational concerns were adequately represented when that study was being put together?

General BURKE. I think the command had every opportunity to present its views to the Air Staff in the person of General Block, and he would be the best witness as to his particpation in the study, but I heard nothing to indicate that he didn't participate fully.

Mr. OLD. Has the command had an opportunity to formally review the document?

General BURKE. We have received copies of it. We have not been asked for a formal comment on it.

Mr. OLD. Do you have any general comments you care to make about it?

General ELLIS. General Larson, do you want to talk to the threat assessments?

General LARSON. Yes, sir, we have had a chance to informally look at the document and take a look at the threat that was used in that document. As you know, generally [deleted].

Mr. OLD. It seems to me the two major differences between the joint strategic bomber study was completed in 1974 and this modernization of the strategic bomber force was an assessment of the threat and the value of ECM. The chairman and Mr. Smith have covered ECM. But what is SAC's position re the assessment of the low level threat and the ability of the bomber to penetrate against these defended targets? Do you disagree with the conclusions of the threat assessment of the study?

General LARSON. I have a presentation that talks to the threat against the low flying penetrator, if you desire.

General ELLIS. In comparison to the bomber is what he is talking about.

General LARSON. That is correct.

Senator MCINTYRE. Why don't we show those slides, please?

General LARSON. All right, sir.

We attempted to examine the threat to the low flyer and recognize that we were dealing with a lot of uncertainty in the outyears. We used our [deleted].

RADAR THEORY

- RADAR LINE OF SIGHT
- CLUTTER
- MULTIPATH
- TERRAIN MASKING

One of the things that weighs very heavily on anyone attempting to defeat a low flying penetrating aircraft or cruise missile is the factor of altitude. Altitude affects the radar to a great extent. Radar line of sight is reduced significantly because of the simple bald Earth line of sight from an antenna. There are ways, of course, to attempt to compensate, such as raising the antenna to a higher altitude. [Deleted.] A significant factor when you are dealing with a very small radar cross-section target. There are other radar tracking problems including clutter, multipath, and terrain masking.

Clutter simply is the return from the ground close in to the antenna, and in some cases all you do is aggravate the problem by putting the antenna a little higher. The clutter goes out a little bit further. That means you can become blind to a penetrating object a little bit earlier on. [Deleted.]

Multipath is a problem that occurs when you see different radar returns from the bounce of the signal off the terrain to the aircraft. As you reduce the altitude of the aircraft or the cruise missile, the multipath problem gets worse. It distorts your ability to track accurately, so you build in some tracking errors.

[Deleted.]

Then, the clutter aspect starts to take effect to compound the errors from that range on in.

[Deleted.]

[Chart deleted.]

This chart shows the coverage, and I think I need to explain it a little bit. The amount of time that a penetrator is in coverage is terribly important in fighter attrition. [Deleted.]

[Charts deleted.]

Mr. SMITH. General, I have seen charts like that in the modernization study. I don't understand the utility of only displaying the effect of assumptions regarding ECM effectiveness without an analytic judgment about that key variable. It seems to me that what we need is some sort of a basis for assessing the judgment whether ECM will work or not.

Mr. SMITH. We appreciate that. I just say that at the analytical level, whatever you want to call it, where we work as staff, that the ECM issue has been one of the most difficult issues we have confronted. We go to the intelligence community, and they say it is not really their responsibility to look at the interaction between American systems and Soviet systems.

General LARSON. Yes, sir.

Mr. SMITH. We go to other elements in the Department and they say it is not really their responsibility to make what are essentially intelligence estimates. If I may say so, one of the helpful aspects of the work you do is that you clearly have the responsibility for that kind of net assessment and operational intelligence. I can't find anybody in the Department with an equivalent responsibility at the OSD level.

General LARSON. Well——

Mr. SMITH. Is there someone you could direct us to?

General ELLIS. The application of our systems against that is our business, obviously, and I think that within certain restrictions we can from an operational sense, maybe not analytically, from an operation sense I think we can show you that we have a high confidence

in our ability to get good effectiveness out of our ECM when applied with caution when the threat is recognized and not contingent——

Mr. SMITH. Mr. Chairman, may I suggest the subcommittee invite SAC to provide for the record, a statement of whatever length is appropriate, which states their best operational judgment on the effectiveness of ECM in enhancing the survivability of the penetrating bomber. You state it is clearly your responsibility and you have had the most substantial experience in Government.

General ELLIS. we would be pleased to do that.

Senator MCINTYRE. We would like that for the record.

[The information follows:]

The primary purpose of electronic countermeasures (ECM) is the protection of the penetrating bomber force in an electronically directed threat environment. This does not imply that ECM is expected to provide an invincible shield any more than we can expect losses to be nonexistent in a combat situation. Nevertheless, the effectiveness of ECM has been found to substantially enhance the survivability of the penetrating bomber based on historical lessons and equipment tests. Actual combat results and tests [deleted] have proven ECM is a necessary asset for bomber penetration. These results and tests continually reinforce the high confidence we have in the payoff of ECM. The confidence we have today cannot be extended against future threats. The interplay of ECM and enemy ECCM is continually changing. Therefore, we must continually evaluate new threats and update our present ECM to insure continued confidence.

In North Vietnam the use of electronic countermeasures, combined with other tactics, resulted in a lower aircraft attrition than planners had expected in Linebacker II. This was at high altitude and against an air defense threat which was then postulated to severely tax the B–52's penetration capability. In spite of the North Vietnamese attempt to emphasize the attrition of the B–52, the loss rate was less than two percent. The introduction of new equipment and techniques, [deleted] in an attempt to overcome our ECM further emphasized the effectiveness electronic countermeasures provided.

In the Yom Kippur War, a lack of preparedness to use countermeasures resulted in loss rates similar to those experienced by the U.S. tactical forces early in the Vietnam war. Those loss rates were significantly reduced only after the extensive use of ECM was employed.

[Deleted.]

The Electronic Warfare Joint Test, conducted in 1972–74, used highly instrumented [deleted]. When the application of various equipment and tactics mixes was compared against a baseline no-ECM case, computer aided analysis of tracking errors showed considerable effectiveness in the ECM capability to affect miss distances. Specific testing of one countermeasures system, the [deleted] has demonstrated significant degradation of these systems. In another test [deleted] jamming equipment, a reduction was obtained in the number of missiles with miss distances of [deleted].

On the other hand, where significant intelligence gaps occur, as in the [deleted] our confidence is substantially less. Intelligence collection is the key to a viable ECM program.

Future actions will require an extrapolation from intelligence and tests because of the dynamic nature of countermeasures.

[Deleted.]

Because ECM is reactive in nature, gaps will always exist. The extent and duration of those gaps will be dependent on the amount of intelligence provided and how rapidly we get the proper equipment into the field.

[Deleted.]

General LARSON. This is a B–52 against both.

General ELLIS. May I ask, Mr. Chairman, have we satisfied the basis of your question, or would you like to see the rest of these?

[Discussion off the record.]

Senator MCINTYRE. On the record.

General, the manned penetrating bombers have possessed a set of important characteristics of special interest including:

Their recallability;

Their ability to suppress defenses with SRAM;

The flexibility to use them conventionally;

Their delivery of large-yield gravity bombs on area targets;

Their ability to assess the damage from other weapons and to use their weapons more efficiently in damage assessment strikes and to thereby increase target coverage; and

Their ability to be dispersed to enhance their survivability against preemptive attacks on air bases.

There may be other similarly important characteristics of the manned penetrating bomber, but let's examine now at least these six. As we tried to define an optimally mixed force, I feel we should insure that constant levels of capability in each of these categories be retained as we move some of the force from the penetrators to standoff cruise missiles.

How do we insure that the cruise missile element of our force retain as much time before it would need to be recalled as is currently the case?

General MILLER. The current procedure now is that in the event of warning [deleted].

Cruise missiles, of course, once they are launched from the aircraft, there is no way that you can recall them, but they would have the capability as long as they are in the aircraft of being recalled the same as the aircraft is today.

Mr. SMITH. If you had externally loaded cruise missiles on a B–52 and you had to calculate the amount of fuel necessary to return that plane back to Conus or to another recovery base, would the drag and weight of those externally loaded cruise missiles define a greater tanker requirement to maintain the same level of recallability?

General MILLER. There is a greater tanker requirement required. There is a greater tanker requirement when you have external weapons on the aircraft, yes, sir.

Mr. SMITH. Could you compute that for the record, what would be a fair basis for just sizing the problem?

[The information follows:]

Currently, a representative B–52G sortie has the capability to launch, fly planned route to the positive control turnaround point (PCTAP), orbit for approximately [deleted] and recover at the launch base. This mission profile now requires a total air refueling onload of [deleted]. Our initial study indicates that to maintain this same capability with the B–52G force externally loaded with cruise missiles would require an additional average onload of [deleted] lbs per sortie. This equates to [deleted] additional tanker sorties.

Senator MCINTYRE. The second half of that question is that I understand that currently we use [deleted] SRAM's to suppress defenses, but that against a more severe Soviet defense, we may well use increasing numbers. What is SAC's judgment about the need to suppress defenses in order to insure cruise missile penetration?

General MILLER. Currently we have a [deleted] of weapons that are used principally in defense suppression. We have approximately [deleted] as I remember, that are aircraft weapons that are used to suppress defenses now.

I would anticipate that you would need probably the same number if you are going to penetrate in the same area.

Mr. SMITH. Mr. Old's earlier question seems to be a central one. In your planning, as I understand it, you do not currently intend to put a cruise missile up against a heavily defended target. You intend to use it against an easier target; is that correct?

General MILLER. [Deleted.]

Mr. SMITH. Suppose the mix gets richer toward the cruise missile and thinner on the penetrator with the SRAM, then you not only have to apply some of those cruise missiles against more heavily defined targets, but you have fewer SRAM's. Is there some point where this would require you to put more than one weapon upon target in order to assure its penetration whereas in the current case or base line case you might suppress it with the SRAM from a penetrator?

General MILLER. That is true; in order to improve its probability of arrival, probability of arrival of a weapon at a given target we may have to commit more weapons in order to insure target destruction.

Mr. SMITH. Could you size that for the record both in units and in some useful aggregate as it relates to the forces that were postulated?

[The information follows:]

[Deleted.]

Attrition values for the ALCM are yet to be determined. Using the information available, HQ SAC/IN has estimated the ALCM probability to penetrate [deleted].

Mr. SMITH. Would you like to comment on how ASALM might improve your tradeoff on that. Say, assume if it had a [deleted] mile range max, does it help it much?

General MILLER. I would think that it would. First of all, of course, you would achieve the same relative benefits that you get using a SRAM. The increase in benefit would come from the capability of flying a straighter line through the target system and not deviating the B–52 in order to get closer to that defended target. It would give you more opportunity to stay further away from defenses.

Mr. SMITH. Penetrator?

General MILLER. Yes, sir. Probably improve the probability of arrival.

Mr. SMITH. Could you see using ASALM on a standoff cruise missile carrier to soften up the perimeter?

General MILLER We have not considered that, but I guess that would be a possibility.

General BURKE. A more likely possibility would be [deleted].

Mr. OLD. Commenting on the last point about the ASALM, we had asked Dr. Perry is there still a requirement to accelerate development of the ASALM and why, and what is the major target ASLAM is planned to defeat. Dr. Perry says the ASALAM will [deleted]. That is OSD.

Mr. SMITH. The subcommittee asked DOD in another question, how a 750-mile ASALM would be used to suppress defenses for a [deleted] mile cruise missile. There may be some way, I thought maybe you folks could help us understand that.

General MILLER. Yes; there is some logic to that because in order to fire a cruise missile from standoff over water you have to develop a land fall matrix which may be as much as [deleted] miles long. There

are few areas along the coastline where you can put these matrices in that are not close to some defenses. So it would seem likely if you were going to standoff [deleted] miles, whatever that [deleted] might be, to release your cruise missiles, then you could possibly use ASALM against those defenses.

Senator McIntyre. Here are some questions that bear on the same original idea. How do we insure, General Ellis, that a mixed force that includes cruise missiles would be as flexible for conventional use?

Mr. Smith. We may have covered that with the dialog.

General Ellis. I think we did on the dialog on the B–52D, sir.

Senator McIntyre. All right, how many more cruise missiles will be required in the aggregate to insure the same level of damage on area targets currently targeted by gravity bombs?

General Ellis. I would think that would depend upon any one of several force options that you look at and the loading that you accomplish, the tradeoff, in some cases bombs, with ALCM's. We can try to give you something specific for the record on that.

Mr. Smith. If you could provide something that would give us an analytical handle on it. Since everyone is trying to assess alternative force mixes, clearly this is one of the multipliers that must be put into the calculation. Frankly the calculations we have seen formally from other elements of the Department have not reflected that kind of rather straightforward multiplier.

[The information follows:]

Particularly important in any tradeoff calculations are the estimates assigned to various system parameters. Most critical are the estimates used for weapon characteristics, the target set across which the computations are performed, and operational factors affecting the delivery of the weapon on target. Three distinct computational techniques are described here. The ratios that have been computed are based on current estimates of critical system parameters.

One method of calculation is to replace each gravity weapon potentially assigned to [deleted] targets with the number of cruise missiles necessary to ensure the same level of damage on those targets. This method yields a cruise missile to gravity bomb replacement ratio of approximately [deleted]-to-1. Alternatively, we might consider an optimal replacement of the aggregate number of gravity bombs by some aggregate number of cruise missiles across the entire target set. This method results in a lower bound ratio of approximately [deleted]-to-1. Thus, using these methods, the number of cruise missiles required to replace the [deleted] gravity weapons considered ranges from [deleted].

A third, more generalized method of computing the replacement ratio is to use the Equivalent Megatonnage (EMT) static measure of merit. Using this method approximately [deleted] cruise missiles are required to replace the [deleted] gravity weapons considered.

Assumptions: The [deleted]-to-1 ratio was computed across the entire set of [deleted] targets, not just those currently covered by gravity weapons. This same ratio was based on a cruise missile yield of [deleted] whereas a yield of [deleted] was used in computing the other two ratios. Actual replacement figures were computed by multiplying current number of gravity weapons allocated against [deleted] targets by these ratios. Ratios apply only to weapons delivered on target and may change somewhat when probabilities of arrival at target are considered. Does not consider [deleted] targets.

General Burke. Our recommendation would envision carrying [deleted]. To the extent that one did reduce the number of gravity bombs employed against area targets, cruise missiles would be substituted, I think, on the order of a factor of [deleted]. However, in the case of hardening point targets, the substitution is [deleted].

Mr. SMITH. Would force 3 reduce the number of gravity bombs?

General BURKE. [Deleted.]

Mr. SMITH. Would it be useful just to reflect on that a minute? That seems a fairly fundamental question.

[Slide deleted.]

General BURKE. That is slide 61 if you would, please.

Mr. SMITH. All right. If we add up all the gravity bombs in the first four columns and the sixth column——

General BURKE. Would you like to compare that with today's force?

Mr. SMITH. Whatever you think would be a useful basis for comparison [deleted] gravity bombs.

[Slide deleted.]

General BURKE. Let's start with slide 62 and we will look at the force as loaded today.

Mr. SMITH. We have [deleted] gravities and force 3 would reduce that by [deleted].

Slide [deleted.]

General BURKE. Now we go to slide 63.

Mr. SMITH. The point assumes that gravity bombs are used mostly on area targets——

General BURKE. I defer to General Miller on that.

Mr. SMITH. [Deleted] roughly, how many of those currently are on area targets?

General MILLER. Captain Stovall.

Captain STOVALL. That would be something on the order of [deleted] percent of those.

Mr. SMITH. So how do these elements translate into a multiplier of extra cruise missiles needed to retain the same probability of damage on that [deleted] percent of the area targets that are currently attacked by gravity bombs?

General MILLER. I could give you an example that compares just one weapon as a useful tool. If you have a [deleted] weapon it will cover an area of approximately [deleted] square feet. A cruise missile used on that same area centrally would give you a coverage of approximately 11,000 square feet. In order to cover the same area that you do with the [deleted] weapon it would take approximately [deleted] cruise missiles to cover that area.

Mr. SMITH. If you reduce your gravity bombs by [deleted], if the current force is applied about [deleted] percent to area targets, if that same rate of use would be maintained, you may then have [deleted] gravity bombs on area targets. You would then have to replace at approximately a ratio of [deleted] which means you might have a requirement for [deleted] cruise missiles, to replace [deleted] gravity bombs, in order to maintain the same level of damage on area targets. That is just a stab at it. If that doesn't make sense, please give us a better way of calculating it for the record.

General ELLIS. We would like to supply that for the record.

[The information follows:]

We agree with Mr. Smith's rough calculations. In comparing current gravity weapons against a [deleted] there could be as much as a [deleted] tradeoff on area targets.

Senator MCINTYRE. I am told that SAC's efficient use of weapons will be greatly increased through [deleted]. How does one calculate the

number of cruise missiles that would be necessary to add to the force to maintain the same target coverage as would have been the case with a penetrating force using [deleted]?

General ELLIS. We are just getting into [deleted]. We haven't finalized that to the point, we don't have the degree of confidence in that yet that we think further tests will give us. I think we are going to have to provide you hopefully an answer in the future on that when we have completed our tests.

Senator MCINTYRE. For the record.

[The information follows:]

[Deleted.]

Senator MCINTYRE. How much more difficult will it be to disperse the cruise missile portion of the mixed force compared to the penetrators? What penalties in tanker capabilities or survivability might we have to pay?

General ELLIS. You mean the G force. What force are you talking about?

Mr. SMITH. Take the current G or H as a baseline regarding your ability to disperse them and the resulting tanker penalties. I understand there are some. Could you compare that baseline dispersability to a B–52G loaded with external and internal weapons, as in your postulated force. Would you have to pay a penalty in tanker capability in order to maintain a constant level of dispersability. Or would you have to pay in survivability? What would be the effect?

General ELLIS. We haven't looked at that as far as I know.

General BURKE. General Miller may have given it some thought. It's in his area.

General MILLER. I would think we would want to look at this in some detail. It is obvious that, as I mentioned before, whenever you hang external weapons on aircraft that you decrease its range and in addition to that you have the additional weight which you have to compensate for by offloading fuel, but it is a rather complex question to answer.

Mr. SMITH. I appreciate that. Is it a valid question, is it something that might cost something that is serious enough to inquire?

General MILLER. I think it might be well if we look at it.

Senator MCINTYRE. The planned yield of the cruise missiles has been [deleted]. What would be the affect on your planning if that yield were reduced to [deleted].

General MILLER. Sir, when you look at the damage expectancy that you achieve with CEP's under [deleted] feet, we can see little difference. It comes out in the [deleted] decimal place between [deleted]. Particularly with the CEP's that are being advertised for the uses under [deleted] feet, it seems to make little difference in an analytical calculation.

Mr. SMITH. Is there any difference on area targets?

General MILLER. I would like to submit that for the record.

General BURKE. It would be linear except it would be two-thirds——

Admiral MCMULLEN. No real difference, one-third scaling at that level.

General BURKE. It is two-thirds of one-fourth.

[The information follows:]

General MILLER. Yes. [Deleted.] The EMT result closely approximates a comparison of the damage radii of the two warheads.
Calculations are:
EMT=(yield) ⅔ for yield in megatons.
[Deleted.]

Senator MCINTYRE. General Ellis, you said in your statement that it is important to SAC to procure or modify [deleted] compatible with the SRAM rotary launcher. I am only aware of three weapons that have been in recent development that fit that recent development: SRAM–B, ALCM–A, and ASALM. Are there others? what are the advantages of each?

General BURKE. The major attraction of SRAM–B is the fact that it is impervious against all known and expected Soviet defenses, at least in the near term. It has that great capacity to overfly terminal defenses and to attack reliably and accurately the objective targets. ASALM would have the same sort of characteristics but better in that you could stand off at a further range. The gravity bombs would have the attraction of [deleted]. The cruise missile would have the attraction of the longer range routing flexibility, increased target coverage. We have run excursions on all of those and the differences in damage extracted are relatively insignificant. They are all effective solutions.

Mr. SMITH. If you had your choice, which of the four in the near term, since ASALM is in little bit different period, which of the four that would be available in the early 1980's seem the most attractive to you providing you had the extra spaces in the SRAM racks?

General BURKE. It seems to me with the closeness of the results achieved between those that the decision ought to be made on economic grounds, and I am not competent to say what that is.

[Additional information follows:]

By economic grounds, I had more in mind than simple costs. I was thinking of a comparison of the incremental contribution of each alternative relative to its incremental cost. If all were available at equal costs, I would rank them in order of desirability: ASALM, ALCM–A, SRAM–B, B–77, B–61.

Mr. SMITH. Thank you.

Senator MCINTYRE. General Ellis, in your statement you strongly endorsed America's jet tanker fleet. What is SAC's position on the number of tankers needed in the mideighties?

General ELLIS. Our present force structure numbers approximately 600. We desire to maintain that level.

Mr. SMITH. About 600, General?

General ELLIS. Yes.

Senator MCINTYRE. Constant?

General ELLIS. The current plus the ATCA we hope phases into the general purpose forces.

Senator MCINTYRE. In considering the option of a pure standoff cruise missile launch force, is it SAC's position that the need for number of tankers would, as a consequence, decrease? Obviously not, from the answer you just gave.

General MILLER. I have a slide that may make that clear. Slide 64, please. [Slide deleted.]

Sentor MCINTYRE. I hope it is a picture.

General MILLER. I am afraid not. These are just numbers. This compares with the three forces we talked about earlier. Well, today's force, the No. 3 force, that General Burke described is in the center here, and the alternative that we have proposed today we have [deleted] total SAC tankers that are required in support of the SIOP. We have [deleted] that are available, leaving us a shortage of [deleted]. You can see that with the SAC alternative force we would have to continue to use all those that are available to us while the other alternative forces would require fewer, [deleted] leaving an overage of [deleted].

There has been some discussion about removing some of the tankers from the force and the bottom part of that chart takes that into account and subtracts [deleted] tankers out of the force, which leaves you a shortfall under the dedicated tankers column, as indicated in the last column for each of the forces.

Mr. SMITH. General Miller, the second line from the bottom, the [deleted] figure, is that the figure you say that is associated with force 3 that General Burke described?

General MILLER. Yes.

Mr. SMITH. And do I understand correctly that if that were thought to be a valid or useful force, that then at least the differential between the [deleted] and [deleted] would be fairly substantially reduced. You get pretty close to what you would have and what you would need?

General MILLER. Yes.

Mr. SMITH. General Burke, you had some calculations I understand about the comparative costs of those two forces, 3 and 4. Did you include the tanker requirement as part of the cost assessment?

General BURKE. We assumed that both forces were going to take all of the available tankers. We don't think the evidence will support the proposition that you can retire tankers by going to force 3 or any other reasonable force. Not mentioned, yet is that there are requirements for KC–135's in addition to the strategic role and all of the tankers are committed to that strategic role. I might clear up a point before I go. Although General Miller shows [deleted] in the SIOP, the remainder—there are [deleted] total—the remainder are [deleted]. So I would think a compelling argument could be made to keep all of the tankers we have both for strategic purposes and for tactical and airlift support.

Mr. OLD. How many tankers does the Air Force have now total?

General BURKE. [Deleted.] KC–135's.

Mr. OLD. If SAC requirements come about and the TAC requirements are going, do you get the dedication?

General BURKE. That is going to be a very tough decision that will have to be made at the highest levels in the event, and you are absolutely right.

General ELLIS. We are assuming——

Mr. OLD. The shortage can be more than actually portrayed depending upon what the national command authorities decided. How it decided it was going to support the conventional forces being deployed by supporting strategic forces, maybe airborne alert or something to that effect. General Ellis can you clarify that?

General ELLIS. Obviously, if the SIOP were initiated it takes the highest priority. The tanker force would be dedicated to that task.

It may be that because of preceding conventional hostilities or a crisis situation some number of tankers would be out of position. Then it is a question of how fast you are implementing and it may be that we may have to hold back some elements of the option selected until the tankers are in position.

Mr. SMITH. Is there current discussion that you are aware of within the Department, if you feel free to discuss it, to retire tankers or simply to place tankers in the Air Reserve fleet?

General ELLIS. There is not within the Air Force.

Senator MCINTYRE. General Ellis, does SAC in its force application for the long-range air-launched cruise missile assume that the cruise missile will travel a straight line from its launch point to the target?

General ELLIS. No; we do not. We feel it will have operation deviations or navigational requirements to meet. There will be some deviations.

Senator MCINTYRE. What factors does SAC calculate will degrade the [deleted] kilometer range that has been discussed in the strategic arms limitation talks?

General MILLER. I have some slides that will show you this:

Joint strategic bomber study

Defense avoidance	[Deleted.]
Terrain avoidance	
TERCOM navigation	
Terrain masking	
Total	
Current bombers	

This first slide shows you some of the degradations that were listed in the Joint Strategic Bomber Study. Defense avoidance takes into account your navigational deviations. As you suggested, sir, terrain avoidance constitutes adding air speed in order to clear obstacles. TERCOM navigation is the deviations in straight line path to get from one suitable area for TERCOM matching, terrain correlation matching to another, and terrain masking is deviations from a normal straight line path to take advantage of natural impediments to defensive forces.

That totals up as you can see to [deleted] percent. We think that that could be in fact a conservative degradation because we experience in routing bombers from the start descent point from the target area [deleted] percent degradation to avoid defense as we show on the particular slide.

PLANNING CONSIDERATIONS

Time over target—slow down/speed up.
  Early or late launch.
  Adverse winds.
  Fratricide free.
Initial planning.
  Time—[deleted].
  Fuel—[deleted].

Now, this slide shows some of the things that a planner must take into account. He could have an early or a late launch, and by that I mean that the entire SIOP is a very well coordinated finely tuned

plan so that all forces are timed to arrive at a given time within plus or minus very small increments, and in order to prevent fratricide. In order for him to make his required timing it may be necessary for that cruise missile to speed up or slow down. He may run into adverse winds. These are something that the planner cannot calculate in advance and would have to assume would be a worse case.

And again he must make this vehicle [deleted] as much as possible.

On the bottom slide for initial planning you see the time. For max we would plan it at [deleted] which is an intermediate speed. The cruise missile is determined to fly or being planned to fly at [deleted]. We wouldn't want to plan it at the slowest speed, or plan it at the highest speed, so we would pick something in the middle. However, in planning the amount of fuel we consume, we would have to plan it at the highest speed because we don't know that he may not have to fly at that speed depending on whether he has an early or late launch. Those are factors the planner must take into account.

[Slide deleted.]

This particular slide happens to pertain to the ALCM–B, which is the extended range vehicle, one of those that are in contention. It has a useful full load of [deleted] pounds. He can travel those distances you see at the maximum altitude indicated. There is a penalty that you pay for flying at the higher mach obviously, and that is indicated at the bottom of the slide. If you fly at [deleted] you suffer a [deleted] percent degradation, or [deleted] percent range differential. If you fly at mach [deleted] you could suffer as much as a [deleted] percent degradation.

[Slide deleted.]

The Joint Strategic Bomber Study degradation as we have indicated has been somewhere between [deleted] percent. Those planning considerations that I have just covered with you range from [deleted] percent. There is also the possibility that [deleted] could be extended. What that extension could be we don't know. But it could be extended through [deleted]. So we have just left that blank. But taking into account those factors which we know reasonably well, and which we feel we have a reasonably high confidence in, we feel that there is an average degradation of approximately [deleted] percent to the advertised range of the cruise missiles under consideration which would mean, of course, if you had a cruise missile that could fly [deleted] applying that [deleted] percent degradation, he would then fly approximately [deleted] miles.

General Ellis. I would like to add for the record, Mr. Chairman, that, as I have mentioned several times today, we don't know a lot about laying this force down yet. These figures that you have seen today are initial figures, they have not gone through the rigid scrutiny that they would go through in the application of the SIOP, and we should take them in that light.

General Burke. I might also add that much of this problem could go away [deleted].

General Miller. You will note also here we start with [deleted].

Mr. Smith. The subcommittee has seen the usual maps with the arcs, showing the effective target cover edge of standoff ALCM's. General Slay showed a slide that talked about a [deleted].

The subcommittee submitted some questions to the Department about the character of that part of the target base and so on. But I wonder if you might provide for the record a comparable map and estimate of the target coverage of a cruise missile, degraded the way you have just mentioned for operational purposes by [deleted] percent, starting at the same place as General Slay did [deleted].

In any case, whatever that missing percentage is, is it true or not that the penetrators in the mixed force would still be able to cover [deleted] percent of that target base, and including especially that which would not be covered by the standoff cruise missile?

[The information follows:]

Penetrators would be able to penetrate [deleted] again using SRAM or comparable type weapons to attack those highly defended areas. [Deleted.]

[Slide deleted.]

General MILLER. [Deleted.]

Mr. SMITH. Now in the group, in the postulated force of General Ellis, [deleted].

General MILLER. I would think we would employ them in both manners. I can show you a typical kind of mission that we have looked at as an example. Let me see slide 134, please.

The first slide I will show you is a SIOP mission as planned today with the [deleted] weapons on the aircraft, [deleted] SRAM and [deleted] gravity weapons. This particular mission is a G model mission that comes out of Griffiss Air Force Base, N.Y. Obviously [deleted] SRAM's in this area.

[Slide deleted.]

This is just some calculations that we have done to determine what the probability of arrival and the damage expectancy would be from those SRAM weapons on this particular aircraft and reasonably high.

While we have this here, it would probably be a good point to explain what goes into determining how much damage you get out of any weapon.

First of all, an aircraft delivering weapons, you have to have the aircraft probability arrival at the point of release of the weapon, then the weapon system reliability of the missile itself. Currently, for the cruise missiles, we are told that it will have about a [deleted] weapon system reliability. That seems to be a little bit high for a new system. [Deleted.] But it didn't start out quite that high. It got that way after use and development for a while.

The probability to penetrate for that, SRAM is given as [deleted] percent, and the probability of arrival then is just the multiplicand of this, which is [deleted] and that times probability of damage for that singular weapon gives a damage expectancy on the target of [deleted].

Now this is the same sortie, but in addition to the weapons that we had on board before, we have added [deleted] external cruise missiles. This is not in the SIOP; it is not planned for the SIOP; it is just a descriptive type sortie. He releases his first cruise missile, as you can see, prior to penetrating in the [deleted] area. The little pink squares, the rectangles, happen to be an area that the Defense Mapping Agency has told us are suitable for laying down cruise missile matrices. And in order right now to have a usable matrix, we have to have what is

called a [deleted], which means there must be a change in the elevation of the ground of [deleted].

So these areas have already been told to us by Defense Mapping Agency that they will be usable for making these matrices, and we have laid them out just to show you some examples.

Now in all of these cases, you will note that we have in fact planned them against unfriendly targets not for any particular reason except we wanted to show how they could be and probably would be used initially. There are some other things you can garner from that. On the top sortie, you can see how that particular missile could make up time or slow down, whatever you wanted to do, by making a particular jog.

There are some other things that are evident here, and that is that you can attack more than one particular target after passing the terminal matrix. You can use one final terminal matrix to attack a number of targets but then, of course, you must funnel all the missiles through that particular matrix.

Now, if you were to take this sortie and fire from a standoff range [deleted], you could not be able to reach these targets in this area. So we looked at it coming from another direction to insure we would be able to get that kind of coverage. [Slide deleted.]

Now, this is the same sortie coming out of Griffiss. We bring them through [deleted].

He would fire at a landfall area and, as I explained, that is an area approximately [deleted] area are somewhat lower.

Next slide. [Slide deleted.]

This particular one shows the same sortie and how we can [deleted].

Mr. SMITH. In all these cases, your ALCM's are the long version.

General MILLER. These are all extended-range vehicles and all carried externally on a G model.

Mr. SMITH. Are they all also degraded by the operational reduction that you mentioned?

General MILLER. Yes.

Mr. SMITH. So in a very broad sense, maybe this is more General Ellis' responsibility, how valid is it to display a map of the Soviet Union and simply draw these arcs on it. As the operator, can you still confidently attack [deleted] target base with your bomber force one way or the other, particularly if you are given a mixed force?

General ELLIS. I think everyone who is drawing maps these days is doing it on the basis of specifications. When we get our first missiles off the line from the two contractors, we have a test program, and these are some of the things we are going to be looking at, radar cross-section and navigation problems, and that sort of thing. Our calculations at that time will get a little more refined and a little more precise.

Senator MCINTYRE. General Miller, would you be kind enough to return to the slide you just showed us so I could ask some questions about ranges. I was thinking, as you were doing this, it must have been an ALCM–A you were talking about. That is because I have no appreciation of distance. Let's take your scenario as it comes [deleted].

General MILLER. [Deleted.]

Senator MCINTYRE. You have three squares, obviously targets. What is the range from when he dispatches his first one? Then show me the other range as you follow your scenario through.

General MILLER. The range from here?

Senator MCINTYRE. The squares are targets?

General MILLER. These are not targets, they are landfall areas. The targets are indicated.

Senator MCINTYRE. He starts firing [deleted]. Tell me the range it is going to be fired at, 2,000 miles or half a mile, or whatever.

General MILLER. He would fire from [deleted].

Senator MCINTYRE. Fires what, a cruise missile?

General MILLER. Fires all of his cruise missiles.

Senator MCINTYRE. All [deleted].

General MILLER. Yes, sir.

Senator MCINTYRE. Where would they go?

General MILLER. This is a [deleted]. He would fire them all at that point. The targets are indicated by the triangles. The ranges, of course, vary to those targets. [Deleted.]

Senator MCINTYRE. When he flies the SRAM there up on the green, what is his range there? In the [deleted] part, the other scenario the plane was coming in from?

General MILLER. He is approximately [deleted] miles out from the target.

Senator MCINTYRE. When he fires the SRAM?

General MILLER. Yes, sir.

Senator MCINTYRE. I think I am all set.

General MILLER. Those are navigation fix points as you go along.

Senator MCINTYRE. He fires all these cruise missiles before he really get there and flies from there on with his gravity bombs and SRAM's.

General MILLER. This particular aircraft [deleted].

Senator MCINTYRE. OK.

Mr. SMITH. Is the moral of both of those charts and the general story you have sketched out, that there are tentative ways in which an ALCM–B, which is degraded in the way you mentioned for operational considerations, can attack the entire target base? The targets you are concentrating on in that chart and in the one immediately prior to it were exactly in the area on some of the maps we have seen [deleted] on standoff cruise missile mission.

General MILLER. Well, it all depends, of course, where you put the standoff position.

Mr. SMITH. Is that a realistic base there? Are you still going to be able to fly off [deleted]. Is that something you feel pretty confident about in the SIOP mission?

General MILLER. That is a very good question [deleted].

Mr. SMITH. If you were denied [deleted] came the other route, you still could get an approximation of how much the target base should be denied in that case?

General MILLER. [Deleted.]

Mr. SMITH. The plane does penetrate beyond [deleted] in the first case?

General MILLER. [Deleted.]

Mr. SMITH. So you [deleted] controlled by that at least in your tentative sketch at this point.

General MILLER. That is right.

Senator McIntyre. Then you go in and fight with your gravity bombs, inflict your damage with your gravity bombs. Then your SRAM is a suppressor; is that right?

General Miller. [Deleted.]

Senator McIntyre. Let me read the rest of these questions so the record will be complete.

What additional effect on range and target planning would there be if the Soviets [deleted].

That is pretty obvious.

OK.

Mr. Old. Continuing with the cruise missile discussion, is there a minimum cruise missile range that SAC feels it must have in order to assure adequate target coverage?

General Ellis. I think, Mr. Old, if we were given our druthers we would say the longer the better.

Admiral McMullen. I think the Secretary of Defense said the more the better.

Mr. Old. I thought someone said [deleted] kilometers.

Admiral McMullen. He did, but he said the more the better.

Mr. Old. Can you do it with [deleted] kilometers?

General Burke. Again I think you would want to see how the [deleted] kilometers was defined, is that the absolute maximum range of the missile or is that the operational range of the missile that makes a great deal of difference.

Mr. Old. You and I know it is probably going to be the maximum range of the missile and not necessarily the operational range. I think you are going to have to apply the degradation onto the [deleted] miles. I mean if a certain percentage of your force is going to depend upon the cruise missiles, it becomes a very crucial figure here.

Do we get down to a point where you would have to say [deleted].

General Burke. One of the criteria against which we evaluated the alternative bomber forces was their ability to hedge against SALT uncertainties including the range of cruise missiles.

Force 4, SAC recommended force, with somewhat stronger emphasis on penetration does provide a substantial hedge against that, and is less sensative to any SALT or technical limitations that might develop for the range of the cruise missile.

General Ellis. I also think, Mr. Old having said this is the system we are going with that the administration will take the necessary steps to [deleted].

Mr. Old. May I proceed?

Senator McIntyre. Go ahead.

Mr. Old. General Ellis, Dr. Perry in response to a question stated we have a greater confidence in the ability of cruise missiles to penetrate Soviet air defense than we have in the effectiveness of ECM to aid bomber peneration.

Would the command agree with that statement?

General Ellis. I think we have already offered, Mr. Old, to provide that for the record.

General Burke. We did, and we can provide that.

[The information follows:]

The CM offers distinct possibilities in its ability to penetrate Soviet air defenses. These are largely due to its advantages in small size, low altitude ca-

pability and the mass of CMs envisioned in the penetration. Though these advantages appear at first glance to offer a greater effectiveness than the penetrating bomber, we are not prepared to place greater confidence in the CM than the bomber for the following reasons.

(a) The smaller size of the CM makes it more difficult to detect and track. However, once detected, it has no capability to determine when it has been engaged nor employ any protective countermeasures. [Deleted.]

(b) If the CM is [deleted] its probability of being killed is higher than that of the penetrating bomber. This results because of the aircrew's ability to determine the threat situation through passive EW equipment and then apply the appropriate countermeasures to degrade the effectiveness of the engaging defensive systems. [Deleted.]

General BURKE. I might say too that I think that is precisely the point on which the B–1 decision turned, and I think obviously from the fact that SAC recommended the B–1 production we had a different view of it than did the Secretary of Defense. But I would add to that that we are all attempting to look into a very opaque future 10 to 20 years from now, and I don't think it is surprising that different men would have different views on these very complex questions.

Mr. OLD. We asked Dr. Perry the following question that Senator Bartlett had asked way back in March, and the question is as follows:

Let's suppose that we modernize the B–52 for a nonpenetrating plane with as rich and versatile mix of these advanced bomber weapons as possible. What kind of targets currently in the SIOP would we not be able to attack confidently by the mid-1980's?

That was the question posed to General Slay, and subsequently posed to Dr. Perry. General Slay's response was, "You could not attack [deleted] targets." Then he went on to say, Dr. Perry, do you agree with that response. Dr. Perry says I do have a somewhat different judgment as regards to the ability of cruise missiles to attack [deleted] targets. [Deleted.]

What would the command response be to the question as initially posed? What kind of targets currently in the SIOP would we not be able to attack confidently by the mideighties, recognizing General Slay's response you could not attack any [deleted] targets.

General ELLIS. Are we talking cruise missiles or penetrators?

Mr. OLD. Well, let's suppose we modernize the B–52 for a nonpenetrating plane, with as rich and versatile mix of these advanced bombers as possible, advanced bomber weapon includes the ALCM and the ASALM, basically standoff, and what if you really in essence had a standoff system, what targets would you not be able to attack confidently by the mideighties?

General BURKE. Accepting the original postulation, if you had a force that rich with a mixture of advanced weapons including ASALM, and sufficient range and cruise missiles of sufficient range, I think the answer is very few, if any. I am not sure, however, that anyone envisions an ASALM of that range just yet.

Mr. SMITH. I think actually the question was premised on the testimony on R. & D. programs that had been suggested in this year's budget. The ASALM that was under discussion assumed a range of roughly [deleted] miles.

The question was really pointed toward obviously [deleted] targets, and the answer we got from General Slay was what figure, Mr. Old, [deleted] percent or better?

Mr. OLD. He said, you could not attack any [deleted] targets.

Mr. SMITH. I think we asked for a figure, and he said, it was roughly [deleted] percent. I think that really bears on the continuing subject of today's hearings, which is whether you, SAC, feel confident enough about the cruise missile as a penetrator against the sophisticated terminal defense to put it flat out against it and be confident it could reach it without first suppressing the defense with a SRAM or some other weapon.

General ELLIS. I think as I mentioned a little earlier, Mr. Smith, on the specifications alone it could probably penetrate. Now, we would like to see the operational tests of live firings and the live guidance.

General MILLER. I think, if I may, we are tending to view this cruise missile in isolation, which is not the way, of course, we look at the SIOP. [Deleted.] So, I would say that if you are trying to attack the whole entire target with the cruise missiles you are probably not approaching it the way we do it.

Mr. SMITH. This was an earlier point of the analysis. Perhaps it still is to some extent in some councils.

The next question is that if you couldn't beat those [deleted] targets without penetrators, would you then have to compensate with another leg of the triad? From the beginning, the subcommittee has tried to bound the problem raised by the B–1 decision by asking whether the United States will need to compensate from other legs of the triad for degradation to our bomber leg in the future if we go to the all standoff cruise missile force? If we do, perhaps you shouldn't go to the all standoff cruise missile force, instead of a mixed force, those are very central issues. I think that was the origin of the original question Senator Bartlett posed to General Slay.

General MILLER. The things you are talking about are adjustments that we make daily in the SIOP. When targets are defended we may take a manned penetrator off the target, apply a missile weapon to it. If you did it en masse, of course, it would require an entire revision, you would have to look at the way you are applying the entire force. But I don't know that it could or could not be done.

Mr. OLD. General Ellis, Dr. Perry in response to another question said the following, "ALCM–A is not required on a B–52 penetrator since we judged that it would provide no significant benefits above those available from present penetrating bomber weapons."

Is the command position that ALCM–A would still be a useful system?

General ELLIS. We indicated it would be a system and if it were produced it would still be a useful system, but I would like to say that there are judgments that have gone into the decision to delete ALCM–A which I am not privy to, but I certainly have no reason to doubt their validity. We are getting a longer range missile which is one of the requirements we said initially. The only difference is it will cost a little more to install because you will need a new rack for it if you carry it internally. But I have no argument with that decision.

Mr. OLD. Does it make sense to go all that way with [deleted].

General MILLER. [Deleted.]

Mr. OLD. [Deleted.]

General ELLIS. On the planning aspect of it, you indicated today, George, we carried an average of [deleted] on the B–52. Is that because of [deleted].

General MILLER. It is because of [deleted].

Mr. SMITH. [Deleted.]

General MILLER. That is correct.

Mr. SMITH. [Deleted.]

General MILLER. That is correct.

Mr. SMITH. And fly them?

General MILLER. Yes, sir.

Mr. OLD. Would this further aggravate that situation?

General MILLER. I think, Mr. Old, you referred to the extended range vehicle.

Mr. OLD. I did.

General MILLER. If you mount the extended range vehicle in the existing SRAM launcher, and I understand from the contractor that this can be done, [deleted].

Mr. OLD. I believe General Ellis in his statement mentioned [deleted].

General MILLER. Those were mixed. Those are external.

Mr. OLD. ALCM? [Deleted] that is what you propose to put on the G. That is how you get to the [deleted] as a requirement, [deleted].

General MILLER. Yes, sir.

Mr. OLD. That is the arithmetic.

General MILLER. That is right.

Mr. OLD. So you would not propose to put the ALCM's internally?

General MILLER. Our proposal was to retain the same penetrating capability that we have today and for many reasons which General Ellis outlined, and carry the [deleted] ALCM's externally on the G model.

Mr. OLD. OSD, how did they respond to this proposal?

General ELLIS. They haven't. I am not sure that the proposal has reached them formally.

Mr. OLD. I see. General Ellis, Dr. Perry in response to a question stated the following: "Based on the Presidential decision to move toward a greater reliance on cruise missiles, we estimate that the majority of the future manned strategic bomber force will probably stand off."

Do you agree with that?

General ELLIS. As I understand the decision, it did not indicate what percentage of the force would be standoff. I think everyone agrees that there will be penetrators and there will be ALCM carriers. Our force, as you can see, the one that we recommend, was to optimize on all the advantages of the ALCM's and of the penetrator to get full coverage of the entire target complex that we are involved in in the SIOP planning.

Mr. OLD. Yes; but Dr. Perry is saying we estimate the majority of the future manned bomber force will probably stand off. From listening to the briefing today it would be my opinion that SAC feels that the majority of the future manned strategic bombers force will probably penetrate.

General ELLIS. That is our recommendation.

Mr. OLD. Thank you.

This may be a question more appropriate for Admiral McMullen.

During the decision time that was going on from about January or February until the President made his announcement, was anybody from your organization, Admiral, asked to brief OSD personnel on the impact of adding a significant number of cruise missiles and how that might impact on the SIOP?

Admiral McMULLEN. No. This is not surprising, though, because the JSTPS is a current planning organization. We are given existing forces to target.

Mr. OLD. It would not have been appropriate?

Admiral McMULLEN. That is correct.

Mr. OLD. Would that have been more appropriate for the command to have been approached and asked how that might——

Admiral McMULLEN. Insofar as it would effect requirements that SAC might have, that could have taken place, but again——

Mr. OLD. Did anyone from OSD come to the command and receive briefings similar to the one the staff of the committee did?

General ELLIS. What time period?

Mr. OLD. It would have been before you took over.

General BURKE. I would like to check that and submit that for the record.

[The information follows:]

The following individuals from the Office of the Secretary of Defense visited Headquarters Strategic Air Command as indicated below. (A list of briefings/briefing officers is included following each name.)

Mr. Walter B. Slocombe, Principal Deputy Assistant Secretary of Defense, International Security Affairs, OSD, visited this Headquarters on 15 March 1977:

SAC: Present and Future (Brig. Gen K. H. Burke/XP)

Command Control/SAC Applications of Tactical Warning Information (Col K. L. Peek, Jr./DOC) (Maj S. J. Harris/DOCOP–Briefer)

Soviet Military Capabilities (Brig Gen D. E. Larson/IN) Maj R. N. Fritzel/INEA–Briefer)

NUWEP and the SIOP–Gen. Russell E. Dougherty (Col W. M. Kottas/JS–Briefer)

Dr. Kai N. Lee, White House Fellow, visited this Headquarters on 1–2 May 1977.

SAC: Present and Future (Col L. A. Geer/XPX) (Lt Col R. W. Provart/XPXC–Briefer)

Soviet Military Capabilities (Col W. M. Truesdell/INE) (Maj R. N. Fritzel/INEA–Briefer)

Introduction to JSTPS (Col W. M. Kottas/JS) (Maj R. Chojnacki/JSTPS/JLE–Briefer)

Command Control and SAC Warning Control Systems (Col P. W. Maul/DOC) (Capt L. C. Earle/DOCOP–Briefer)

The Honorable Gerald P. Dinneen, Assistant Secretary of Defense for Communications, Command Control and Intelligence, visited this Headquarters on 26–27 May 1977.

SAC: Present and Future (Brig Gen K. H. Burke/XP) (Maj T. W. Holycross/XPXC–Briefer)

Strategic Intelligence (Brig Gen D. E. Larson/IN)

Command Control and SAC Warning Control System (Col P. W. Maul/DOC) (Maj S. J. Harris/DOCOP and Maj G. L. Wakefield/DOCOW–Briefers)

Mr. OLD. General Ellis, another response by Dr. Perry went as follows: "We tentatively plan to deploy long-range cruise missiles on the 150 B–52G's." The Air Force had previously considered deploying 900 short-range cruise missiles on penetrating bombers with the B–1 in the inventory.

Now the force 4 is your recommendation?

General ELLIS. Yes, sir.

Mr. OLD. You would not agree with the 150 B–52G's, would you, with the long-range cruise missile, or do you agree with that?

General ELLIS. Yes.

General BURKE. Our force 3 includes [deleted] extended range cruise missiles on [deleted].

Mr. OLD. OSD is looking for a total of [deleted] cruise missiles and you were looking for a total of [deleted]. Are those the figures?

General BURKE. I am not aware that there is an OSD position per se. That is under discussion, and that is one of the principal alternatives that is being looked at. The larger number, [deleted].

Mr. OLD. General Miller's example was an aircraft loaded with [deleted].

General MILLER. The standoff example was [deleted].

Mr. OLD. Did you have a model picked out in that case or just a carrier?

General MILLER. Just what you could put on the aircraft if you loaded it with [deleted] external and [deleted] internal.

General ELLIS. I would hope, Mr. Old, that that decision is still open, that one of the options that you could go to to reach that larger number would be a dedicated ALCM carrier other than the B–52G which the Defense Department wants to look at.

Mr. OLD. Is it a good idea at this early date to get these models kind of locked in on some going to be penetrator and some going to be standoff shooters?

General ELLIS. At this point, as I understand, it doesn't involve 1978 money, and I think that if they chose the options can be left open to a later budget cycle.

Mr. OLD. The next three or four questions relate to the problems involved in bringing a new weapons system into the inventory, and I know in your career, General Ellis, you have had a lot of experience with a number of systems.

In general, how long is it after IOC of a new system that the commander can begin to have full confidence in the system; ready to deploy it and ready to use it? Is that time always synonymous with IOC?

General ELLIS. A lot of people have different interpretations of IOC.

Mr. OLD. I will let you define IOC.

General ELLIS. I would define IOC of a wing, for instance, as a first operationally ready squadron that is ready to perform its mission, qualified to perform its mission.

Now, within that context would you repeat the question?

Mr. OLD. Yes, sir.

When that squadron within that wing has its new weapons ready, it has met its IOC, does it mean at that time it is ready to go to war, so to speak?

General ELLIS. Let me put it this way and I can give you a precise example, the second wing to receive F–15 aircraft was the 36th Wing at Bitburg. We received the first squadron of aircraft on 1 day, we put two on alert, air defense alert, the next day; we had our ORI, which certified it as an operationally ready squadron, within 1 month. That is in the air defense role itself a relatively complex one, and that is a new system, of course.

Mr. OLD. That was the third wing of——

General ELLIS. Second operational.

Mr. OLD. The first was at Langley, and then——

General ELLIS. Yes; at Luke was——

Mr. OLD. What I am trying to get at, maybe that is the answer, just trying to get at how long it takes to shake out a new system and whether or not you could count on it right away. How long did it take us to be fully confident with SRAM about all the time it took to store it and maintain it and load it, and take it up in the air and operate it and analyze it, et cetera? Are we going to have to go through a similar thing with the cruise missile?

General BURKE. I think the answer to your basic question is historically, there has been great variation. Some systems have come in almost painlessly and have been assimilated with ease and gone right to work, and others we have struggled with for an inordinate period of time to get them to a level of capability considered satisfactory.

The SRAM happened to be in the former category. It was a well-designed system that for budgetary reasons, I suspect, was procured at a fairly modest incremental rate. We were never overwhelmed with it. We brought the 1,100 plus UE SRAM on board in about 3½ years. So the command was not unduly tasked. It worked almost from the beginning, but what we did see was a steady improvement in weapon system reliability and accuracy, and my recollection is that the SRAM probably started out with a weapon system reliability of about [deleted] and over the several years of life of the system has worked its way up to [deleted] and there was about a corresponding improvement in the accuracy. And I think we now see it leveled off, and that is about where it will stay.

Mr. SMITH. General Burke, could you provide for the record a comparison on the basis of the B–1 IOC as SAC defines it? I think you mentioned earlier, formerly it was a couple of wings, and what it would take in cruise missile capability to get a comparable first increment of effective operational force?

General BURKE. We can make that computation and supply it.

[The information follows:]

The B–1 IOC has previously been defined as delivery of the 65th B–1 aircraft to the Air Force. At that point 15 B–1's would be dedicated to combat crew training, 6 NOA, and [deleted] would be on normal day-to-day alert carrying a nominal weapons load. All planning factors considered, we estimate that to deliver an equivalent number weapons on target would require [deleted] B–52's[1] on normal day-to-day alert carrying cruise missiles.

Mr. SMITH. General Larson, I wonder if you would comment briefly on the way SAC views the problem of mobile SAM's as a threat to penetrating bombers, or for that matter to cruise missiles?

General LARSON. Well, [deleted].

Mr. SMITH. How confident are you that you can inform your operators precisely enough as to their location, their operational location, that they can effectively avoid them in their planning?

General LARSON. Well, [deleted].

Mr. SMITH. What do you do with the argument that says if a mobile SAM is a problem to the penetrator; you don't have much confidence

[1] Each B–52 with 20 Cruise Missiles.

in the bomber's ECM, then doesn't know where the mobile SAM is so you can't suppress it, that the penetrator is less attractive than a cruise missile which by virtue of its low-radar cross section could confidently bypass it in any case?

General LARSON. Well, [deleted].

Mr. SMITH. So you have a high confidence in that?

General LARSON. [Deleted.]

Mr. SMITH. So in sum that tactical SAM, although it is mobile, is, to a degree, as fixed from an operator's point of view as a fixed SAM.

General LARSON. Well——

Mr. SMITH. [Deleted.]

General Burke, could you provide for the record in any detail you wish and give the chairman an estimate of the comparative costs of those two forces you described, forces 3 and 4?

General BURKE. Yes; we can do that.

[The information follows:]

Current cost estimates for the modification of B–52G aircraft to carry the extended range cruise missile and the cost of the missiles remain preliminary in nature. More detailed cost estimates are anticipated to be available in October–November 1977 time frame. Estimated procurement costs (then year dollars) for forces 3 and 4 are as follows:

Force 3:	
Aircraft modification	[Deleted]
Weapon procurement	[Deleted]
Total	[Deleted]
Force 4:	
Aircraft modification	[Deleted]
Weapon procurement	[Deleted]
Total	[Deleted]

Operating and support costs for these forces are under intensive study at this time. Results of the current effort will be available in late September 1977.

Mr. SMITH. Can you say now which is cheaper of the two?

General BURKE. Yes; in our analysis based on the cost data that is available to us at SAC, and there may be different data available elsewhere, is that the SAC recommended force is slightly less expensive than the alternative which envisions a larger number of extended range cruise missiles, on the order of about $0.5 billion in initial investment and essentially the same in operating and support costs over a 10-year life.

Mr. SMITH. And there are larger numbers of weapons on target for the slightly less lower cost?

General BURKE. That is our conclusion.

Mr. SMITH. In your calculation for the record, as you lay that out, you might want to make any notes about the tanker issue that we alluded to earlier. On the forward threat of the cruise missile carrier, could you comment briefly on what your best judgment is about the forward threat to the cruise missile carrier as a problem for the stand-off B–52 cruise missile carrier in the mideighties?

General LARSON. In the mid-1980's [deleted].

Mr. SMITH. What would be the capability of a SUAWAC's against a B–52 cruise missile carrier since the B–52 presumably would come in pretty low?

General LARSON. [Deleted.]

Mr. SMITH. General Miller, in your analysis of ways of using the cruise missile in the force, did you consider deploying the extended range cruise missiles inside a B–52? Did you examine substituting, 6 or 8, or whatever it would be, extended range cruise missiles for the 10 or 12 other internally loaded weapons you might use?

General MILLER. The sample sortie that I showed you may have led you to believe we did an examination. We did not do any that I know of.

General BURKE. [Deleted.]

Mr. SMITH. General Larson, could you comment briefly on your best estimate of the effectiveness of the [deleted] against either of the two candidate cruise missiles that are being proposed in the supplemental?

General LARSON. [Deleted.]

Mr. SMITH. You don't have one of those box charts you had for [deleted] against the cruise missile, do you, for the record?

General LARSON. I do not have one of those. My best analysts take a judgment and say that [deleted].

Mr. SMITH. Thank you.

Admiral McMullen, just a couple of questions on your targeting guidance. The committee directed some questions to the Department regarding possible redefinition of the target guidance. The answers are very brief, and simply state that the target guidance is under review.

How much more difficult would it be, or how would you change the methodology of targeting weapons if there were a [deleted].

Admiral MCMULLEN. I think you could, perhaps, bound the answer to the question by [deleted].

Mr. SMITH. Complicating it one step further, Secretary Brown has said in his statement to the House Armed Services Committee that in certain postulated, not quite guidance, but hypothetical guidance, one could say, criteria if [deleted] do that except, however, if [deleted] would go considerably down.

Suppose you had an effective Soviet population dispersal and [deleted] how would that complicate——

Admiral MCMULLEN. Again, as I believe the Secretary has said, and I agree that [deleted].

I am sorry I can't be precise in my answer, but I think it is a very difficult question to embrace. I believe that, it is one that has to be watched carefully in order to see what counters, if any, might be necessary, such as concentrating on relocation sites or things which might serve those sites.

Mr. SMITH. One last question for General Ellis on the matter of effective range of cruise missiles.

When General Slay testified to the subcommittee regarding a postulated cruise missile force which he could foresee in the eighties, he showed a chart which showed the total area that could be encompassed with the standoff cruise missile. A [deleted] kilometer cruise missile, which would be launched from a standoff aircraft [deleted] would reach everything except possibly the area [deleted]. In order to get that, he said we have to penetrate to some degree, or have a longer range cruise missile.

Of course he selected a [deleted] kilometer missile because it has been talked about in SALT. He showed that from the standoff position you could get [deleted] percent of the target base, approximately.

Now, as we review General Miller's earlier charts which display how [deleted].

General ELLIS. That was the impact of one of the profiles he showed you coming in from [deleted]. It is in the bounds of the capabilities of the ALCM as we know it today. It is a feasible tactic, it is one that we have not done precise calculations on.

Mr. SMITH. Thank you.

Senator MCINTYRE. I would mention now and repeat for the record that we on the subcommittee are particularly interested in testing the hypothesis that our future bomber force would be best composed of a mixed force of standoff cruise missile carriers and penetrating bombers. We suspect this combination would complicate and compound the problems of the Soviet defense and thereby enhance deterrence. We suspect that the effectiveness of the B–52 as a penetrating bomber could be staged longer if it were weaponized with internally carried ALCM–A and assume, which would enhance the B–52 target G flexibility, and could be integrated with SRAM.

Gentlemen, it has been better than 5 hours since we started with all of you. We owe a debt of gratitude to you for your coming here and giving us this excellent testimony. General Ellis and your associates, Admiral McMullen, General Miller, General Larson, General Burke, and General Enney.

So with that we thank you and bid you good afternoon.

We are happy to welcome Maj. Gen. J. K. Bratton, Director of Military Application, of the Energy Research and Development Administration.

General Bratton, you may proceed to testify in any manner you wish.

STATEMENT OF MAJ. GEN. J. K. BRATTON, U.S. ARMY, DIRECTOR OF MILITARY APPLICATION, U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

General BRATTON. I would like to go through my prepared statement. I will perhaps add a few other comments and answer any questions at any time along the line.

Mr. Chairman, ERDA has the responsibility for the design, testing and production of the nuclear warheads—W80—for the cruise missiles.

The code name for those warheads is W80. My purpose today is to explain the status and scope of the W80 warhead program. In so doing, I will discuss several warhead design considerations and the associated production schedule.

[Slide deleted.]

The first viewgraph is pictorial. It simply shows the three types of missile systems for which we are designing a common warhead. This is the warhead and then you have the ALCM, the SRAM–B, and the SLCM—known as Tomahawk by the Navy.

Based on cost data developed during 1975 at the time of the "Common Warhead Feasibility Study," we determined that designing,

building and stockpiling a common warhead for Tomahawk, ALCM, and SRAM (AGM–69B) rather than providing different warheads specifically optimized for each system, would result in a net savings over the life of the warhead of several hundred million dollars. Current cost estimates for the program, made just before the President's B–1 decision, indicate that the projected amount of such saving remains valid.

The W80 warhead is being designed to incorporate modern technology which will provide: (1) enhanced safety through the use of insensitive high explosive (IHE); (2) enhanced electrical safety features; and (3) improved command and control features which include the Category D Permissive Action Link (PAL) and a nonviolent command disablement capability.

Significant challenges associated with designing a common warhead for these three missiles include:

INTRINSIC RADIATION

Since the Tomahawk will be coloaded with SUBROC aboard submarines, it is necessary to minimize the intrinsic radiation from the W80 to allow an acceptably low net level of radiation exposure to crew members living in close proximity to nuclear warheads.

WEIGHT

From the beginning of the common warhead program the ALCM has imposed the most demanding weight constraint in order to achieve maximum range.

SIZE

Living within the constraint of the [deleted] has been the most challenging aspect of the W80 development.

[Slide deleted.]

As represented on the viewgraph, the warhead electrical system contains the firing set, [deleted] trajectory sensing signal generator, interconnecting and control box, and the warhead/missile electrical connector. The nuclear system is shown in the next viewgraph.

[Slide deleted.]

This is a very simplified drawing of the warhead for the W80, [deleted].

[Slide deleted.]

The present W80 baseline design is [deleted].

Thus far in the program, there are four acceptable departures from total commonality. They are:

[Deleted.]

A unique trajectory sensing generator (TSSG) for each missile application.

A unique mounting system for each missile application.

None of these departures from commonality affect the basic warhead design.

Alternative design features. [Slide deleted.]

In response to Dr. Currie's letter of October 6, 1976, we have identified possible options for providing an alternative design that [de-

leted] the same size, shape, mechanical/electrical interfaces, and other features of the existing W8 baseline design.

Senator McIntyre. What is that?

General Bratton. [Deleted.]

[Slide deleted].

I would like to show on the next the test program which is relevant to the designs that I just mentioned.

We plan [deleted] tests for W80. The first one [deleted].

In order to explain revisions in the W80 warhead program resulting from the President's B–1 decision and related SRAM–B implications, it is necessary to refer to the elements of the decision which affect missile programs using the W80.

Then I can relate how changes in the missile programs will affect the ERDA warhead development program.

[Slide deleted.]

Here are the changes as we see them, and they are significant, of course, to our program.

SRAM–B was designed specifically for the B–1. If there is to be no B–1, we do not believe there will be a SRAM–B. The ALCM program as a result of the B–1 decision is significantly changed. The number of ALCM's to be built or the schedule on which they will be built has been accelerated, and a new factor has been introduced which is a flyoff or a comparison between the ALCM design as we have known it and what is called TALCM, which stands for Tomahawk air-launched cruise missile. It is a competition. Hopefully a choice will follow between the Navy version and the Air Force version for ALCM.

It will not affect our warhead design, which will fit into either one of them.

We have not received formal notification from the DOD of these changes. This is all based upon out informal coordination with the Department of Defense.

I would like to show the warhead requirements now in the next viewgraph.

[Slide deleted].

I will have to explain this because it is a somewhat busy chart.

The first section up here which is labeled D.D.R. & E. phase 3 is based on the original request that ERDA received a year and a half ago from the Department of Defense to join with them in the engineering development of a cruise missile warhead. That request contained a total build requirement [deleted] distributed among Tomahawks, SRAM–B and ALCM.

Pertinent to our planning, of course, was the earliest IOC of these three which was for the [deleted].

We did join with the Department of Defense in 1976 and began this program. During the period from the spring of 1976 through June of this year, 1977, the program grew in terms of the numbers of missiles and, therefore, warheads to be built.

The total changed from [deleted].

The early IOC for [deleted].

Now, based on the President's decision which was announced on the last day of June, this is the schedule we have, and we will be working directly with the Department of Defense in the cruise missile

program. The current schedule takes into account cancellation of the SRAM–B, which I mentioned, and continuation of the Tomahawk program at the same level that it has been carried at since the inception, [deleted].

However, the current schedule reflects changes of significance in the ALCM program moving [deleted].

Total build of W80 now stands [deleted].

On the chart is an alternative section. This simply lists at the same build number the fact that we could [deleted].

Mr. SMITH. Would that be the third option that you mentioned on your earlier chart?

General BRATTON. This is——

Mr. SMITH. [Deleted.]

General BRATTON. [Deleted].

I put it over here because, quite important to us, is the [deleted].

As you can see on the two alternatives that we feel we are facing now in today's work, [deleted].

Mr. SMITH. So, you are talking about almost [deleted].

General BRATTON. Right. We have [deleted].

Senator MCINTYRE. [Deleted.]

General BRATTON. Yes, sir.

Senator MCINTYRE. I think that is what General Burke said, it amounts to less than [deleted].

Mr. SMITH. SAC said it was "little difference."

Senator MCINTYRE. We will bring that to the attention of the powers that be.

General BRATTON. At any rate this is our planning. As of this time we are, of course, proceeding on that basis. I would like now to say a word about the costs and show the next please.

[Slide deleted].

These are the figures that are in the President's budget request for fiscal year 1978 and figures which are projections of that which is expected to be incurred in fiscal year 1977.

This is the fiscal year 1977 column and this is the fiscal year 1978 column. These are loaded figures; they are not direct costs. If we were to stop the W80 program, we would not get this much money back. We would get about half of this because all of the overhead for the entire production complex is factored out against all of the weapons we are building, but this does give some idea as to the money involved. R. & D. has gone down slightly. It will go down still further as we complete the development effort. [Deleted] but production will go up as we start building.

Senator MCINTYRE. Let me get this.

[Discussion off the record.]

Senator MCINTYRE. On the record.

[Slide deleted.]

General BRATTON. I would like to show the actual numbers of warhead deliveries as we now view them. I have two sections here so you can compare them.

The first is our original schedule that we received from the Department of Defense, and it is the schedule on which the fiscal 1978 budget which Congress received was based.

Mr. SMITH. What date, about, did DOD define that schedule for you? The top part of the chart is based on what, on document dated when?

General BRATTON. The top part of the chart here is based on the original agreement between ERDA and the Department of Defense which also is the basis for this W80 portion of our fiscal year 1978 budget.

Mr. SMITH. When was that document between the two departments dated? Approximately when?

General BRATTON. We received the formal request from the Department of Defense in February 1976. Dr. Seamans, who was then Administrator of ERDA, replied to that in June 1976.

Mr. SMITH. So that schedule is based on mid-1976 timing?

General BRATTON. Yes; and it still held at the time the President's budget was sent to Congress in January of this year. It was late in the spring and this summer that that number began to increase, prior to the President's B–1 decision. Subsequent to the President's decision, we have now assumed this schedule, and this reflects [deleted] I showed you on the earlier chart. It also obviously [deleted].

I do stress, sir, that this has not been sent to me formally yet by the Department of Defense but it is our best coordinated effort so we can [deleted]. That is an important factor.

We can do that assuming that we have successful test results. [Deleted].

Senator MCINTYRE. Delivery of that warhead does not necessarily mean that you have the missile. The warhead comes in and acts as part of the missile. It seems to me we will have 6 or 12 missiles operational.

General BRATTON. We are striving very hard so our warhead production does not hold up the system. We do not want to be the bottleneck in the cruise missile system and I do not think we will be if we can stay on this schedule.

Senator MCINTYRE. Good.

[Slide deleted.]

General BRATTON. Now, I would like to show still another just to show the lifetime costs of the W80 program.

The numbers that appear here are based on the 1978 budget, and that means they are based on [deleted].

However, they will not change a great deal [deleted].

The weapons materials product costs which are not in the military application weapons budget—they are elsewhere in the ERDA budget—will [deleted].

Mr. SMITH. Can you give the unit cost on that [deleted].

General BRATTON. [Deleted.]

Mr. SMITH. [Deleted.]

General BRATTON. [Deleted.]

Mr. SMITH. [Deleted.]

General BRATTON. This is certainly [deleted]. But if you want the latest figures, I will have to supply them for the record.

Mr. SMITH. Would you do that?

[The information follows:]

The unit cost of the W80 warhead based on current acquisition cost estimates is approximately [deleted]. In order to display graphically the differing life

cycle costs associated with [deleted] two sets of cost estimates are presented on the attached chart. The costs on the left in each column (not in parentheses) are life cycle cost estimates and are based on a production quantity of [deleted]. The costs on the right in each column (in parentheses) are the current estimated life cycle costs based on a production quantity of [deleted]. (The latest production quantity estimate is [deleted] with the additional [deleted] being required for quality assurance and reliability testing; however, the [deleted] figure is used for consistency in comparing costs with other data contained in the August 24, 1977, ERDA statement.) Note: The two columns of cost data were derived independently and will not correlate on a direct numerical ratio basis. As the design has evolved during development, additional capabilities have been incorporated at DoD request. These capabilities have caused increases in unit warhead costs. Additionally, there have been substantial changes in reliability testing requirements which have had major cost impact. Essentially, the numbers in the left column represent the costs associated with a conceptual design at the beginning of development while the numbers in the right column represent the costs associated with a mature and more definitive design. To effect a correlation of the current costs associated with varying production builds, a ratio should be taken based on the right column.

General BRATTON. The program has been very dynamic and we have not defined the last dollar figures yet. The weapon activity capital will not change and maintenance and reliability costs will have some variations. We will have some decrease in some areas because we will not have flight test of the SRAM to worry about.

The total system costs here, stated as [deleted].

This figure [deleted].

In summary, changes in the W80 program resulting from the President's recent B–1 decision will likely [deleted].

I will say parenthetically, though, that this is not as much impact as it might appear on first glance because we were always working against [deleted].

Our ability to support the [deleted] date is dependent upon completion of the competitive flyoff and source selection by July 1979. Additionally, [deleted].

Mr. SMITH. Do you have any estimate of unit cost just for the warhead, warhead per cruise missile?

General BRATTON. Direct or loaded costs?

Senator MCINTYRE. [Deleted.]

General BRATTON. Yes.

Senator MCINTYRE. If my division is right, that comes to about [deleted]. I cannot believe that.

Mr. SMITH. [Deleted.]

General BRATTON. Something in the ball park and I would have to give it to you, something [deleted].

Mr. SMITH. Thousand?

General BRATTON. Thousand.

That concludes my formal presentation.

Senator MCINTYRE. Thank you. I have no particular questions. Do you have, Mr. Old?

Mr. OLD. No, sir.

Senator MCINTYRE. In view of the hour, I think you can go ahead.

Mr. SMITH. General Bratton, why do you have a PAL device on a strategic weapon?

General BRATTON. We are putting the PAL device on at the specific request of the Department of Defense. The reasoning that they have

provided us when we queried them on this very point was that the warhead being a common warhead might be deployed in a number of different modes.

Now there is no plan and no instruction to me at this time that this weapon would be deployed overseas, but that possibility has been raised by the Department of Defense. If it were so deployed on foreign soil, they would, of course, need a PAL like all other weapons. It is generally DOD policy for all new systems to have the permissive action link.

Mr. SMITH. Even strategic weapons.

General BRATTON. Even those.

Mr. SMITH. Could you provide three things for the record. First, is how much does it cost you to put a PAL device into the warhead on a unit and aggregate cost basis?

Second, whether it would be possible or feasible really to put a PAL device only on say GLCM's that would be stored on foreign soil; and, third, could you document where the Department of Defense has said to ERDA that all new nuclear weapons must have a PAL device?

General BRATTON. Yes, sir.

[The information follows:]

COST OF PAL

Based on a production quantity of [deleted] the estimated ERDA cost to include a PAL on all W80 warheads intended for use with the ALCM is [deleted]. This translates to a unit PAL cost of [deleted]. These are total cost estimates which include both direct and indirect costs. The cost avoidance could be realized if the PAL requirement was removed would be from the direct costs only and would amount to approximately [deleted].

APPLICATION OF PAL

It is both possible and feasible to put PAL only on GLCM's that would be stored on foreign soil.

GENERAL DOD REQUIREMENT FOR PAL

During the course of a recent Joint ERDA/DoD Safety Evaluation, DoD representatives consistently confirmed that the following command and control criteria should be a part of the basis for nuclear weapons:

"(1) Each weapon shall incorporate a control device to preclude operation in the intended mode by unauthorized personnel while providing the maximum flexibility to selectively employ nuclear weapons at appropriate levels of conflict.

"(2) Control devices should offer the capability to unlock selected subsets of weapons without compromise to other weapons."

The general content of these criteria appear in documents which were associated with the Joint ERDA/DoD Safety Evaluation and a Defense Nuclear Agency Stockpile Improvement Study. The DoD has not formally stated a generalized requirement for PAL devices for all nuclear weapons. Instead, the required military characteristics for each new nuclear weapon are handled on a case-by-case basis. The requirement for a PAL on the W80 warhead is included in a September 27, 1977, DDR&E letter to ERDA.

Mr. SMITH. General Bratton, as you remember, the Senate Armed Services Committee expressed in its report on S. 1339 its hope that the Department of Defense and ERDA might work in a more coordinated way.

Your testimony today is based apparently on formal documentation that references back 1 year and 3 months during which time any number of changes to these programs have occurred, all of them formally documented by the Congress of the United States.

My question is, how do you, as the principal in ERDA, get informed by the Department of Defense—in what formal way? Why can't they keep you more current with their own programs in their information to you?

General BRATTON. Our formal notification, of course, comes through the Military Liaison Committee in the Department of Defense. If there is to be a change in any of our production delivery schedules or the amounts of warheads or the schedule on which they are to be built, that is the channel through which we receive it, and that happens all through the year.

Formally, once a year, as you know, the President receives a joint paper prepared jointly by the DOD and by ERDA, called "The Presidential Stockpile Paper," and in that "Stockpile Paper," every system that we have, those that are in the stockpile already and those that are projected to come into the stockpile, is laid out specifically by fiscal year and by numbers of warheads, when they will be delivered and when they will be built and when they will be retired and disposed of.

That is really a benchmark document because, when that is done once a year, it is normally agreed by the head of ERDA and by the Secretary of Defense and sent to the President for approval.

That was done last year, last fall, so that when President Ford approved the stockpile paper in November of last year, that gave us a benchmark. The new stockpile paper for this year is now in its final draft and it is indeed being coordinated in the Department of Defense now, and from there it will come over to ERDA where we have already informally coordinated it.

We hope to have that in President Carter's hands in September. So, by the end of the fiscal year, we may have a new benchmark, a new approved stockpile by President Carter.

Mr. SMITH. General, take two quick examples of the problem: One is the fact your testimony today only informally reflects what is a matter of formal record, that is, that the SRAM–B has been canceled officially and——

General BRATTON. Yes; I have shown that through my testimony in outlining the W80 program as we see it today. However, I do not have a formal document from Defense to back it up. I don't have a document that says SRAM–B is canceled. I don't have a document that says the [deleted]. Those are our best numbers working with all the elements of the Department of Defense.

Mr. SMITH. The complaint is not with you, General. Who chairs that military coordination committee, or whatever its name is?

General BRATTON. Military Liaison Committee.

Mr. SMITH. Who chairs that?

General BRATTON. That is Mr. Cotter, the Assistant to the Secretary of Defense for Atomic Energy.

Mr. SMITH. Why hasn't Mr. Cotter sat down and written you a note which says we no longer are going to build W80's for the SRAM?

General BRATTON. I cannot give you a positive answer. I can give you the staff answer that comes from his Military Liaison Committee staff. The various elements of the Department of Defense have had difficulty reacting to the President's B–1 decision in terms of specific build number and specific scheduling. They simply, I believe it is fair to say, have not yet formulated their position to the point where they can staff it through and get a letter officially sent to ERDA.

Mr. SMITH. Is that because they have a different position than the President about the cancellation of the SRAM–B?

General BRATTON. I do not know of any element of Defense that disagrees with the cancellation of the SRAM–B.

I am not certain, I do not know of——

Mr. SMITH. Take another example that is more functional from your point of view—the ALCM scheduling. We have discussed this informally before. On your chart, you said that through the presentation of the President's budget this year, that [deleted].

General BRATTON. [Deleted.]

Mr. SMITH. And we discussed informally the fact that the President articulated formally in a documented way to the Congress last January that [deleted].

Is there not some formal and timely way in which the Department of Defense can inform ERDA about this? Who is responsible to do this in the Department of Defense?

General BRATTON. We respond, of course, at any time to any formal document. We do not have to wait for the annual stockpile paper.

Mr. SMITH. Yes.

General BRATTON. We would normally expect to get such a document from the Chairman of the Military Liaison Committee. That is the normal procedure.

Senator MCINTYRE. Is that normal practice followed or is this just a situation due to what you say, the inability at the staff level to read the President's decision to cancel the B–1?

General BRATTON. I think it is the latter, sir. We have a lot of formal correspondence with the Chairman of the Military Liaison Committee making minor adjustments to the stockpile. This was such a major perturbation to their planning, I think they have been unable to come up with an agreed paper to send to ERDA.

Mr. SMITH. What is more difficult to understand is why the Department was unable to inform ERDA about a rescheduling of the ALCM which they expressly defined to the Congress. It would seem to be fairly easy for the Department of Defense, once they have coordinated a piece of paper for the Congress, to simply send you a carbon, if nothing else, saying that this is [deleted]. In that case, apparently, it really did affect your planning.

On your [deleted].

General BRATTON. [Deleted.]

Mr. SMITH. What would be the range of yield uncertainty?

General BRATTON. Normally, we specify a yield uncertainty in terms [deleted].

Mr. SMITH. Please try to phrase it for the record. Could you also provide the committee a date or dates after which, if a comprehensive test ban treaty were agreed to, [deleted].

General BRATTON. [Deleted.] Then this particular warhead development program can be certified.

Mr. SMITH. [Deleted.]

General BRATTON. Yes, [deleted] that I showed here.

Mr. SMITH. Thank you. Are there any impacts on your fiscal year 1978 weapons or military applications allocations of fiscal year 1978 funds by virtue of the President's cruise missile supplemental? In other words, given the details you have described to the subcommittee,

are you going to have to rearrange your priorities within your P. & S. line?

General BRATTON. I do not believe so. I believe the priorities that we have now are proper and will be responsive to Defense even under the changed circumstances.

Mr. SMITH. Thank you.

Senator MCINTYRE. Well, General Bratton, we thank you very much for your able testimony here this afternoon. We appreciate your patience for waiting.

I think now the subcommittee will stand in recess until 10 a.m., I believe, Monday next week. We will have Dr. Perry here and hopefully be able to finish up.

[Whereupon, at 4:50 p.m., the subcommittee adjourned to reconvene at 10 a.m., Monday, August 29, 1977.]

FISCAL YEAR 1978 SUPPLEMENTAL MILITARY AUTHORIZATION

MONDAY, AUGUST 29, 1977

U.S. SENATE,
SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 224, Russell Senate Office Building, Hon. Thomas J. McIntyre (chairman) presiding.

Present: Senator McIntyre.

Also present: Larry K. Smith, Robert Q. Old, George H. Foster, E. George Riedel, professional staff members; Rhett B. Dawson, counsel; Charles Stevenson, assistant to Senator Culver; Len Parkinson, assistant to Senator Bumpers; Ron Lehman, assistant to Senator Bartlett, and Susan Pitts, assistant to Senator McIntyre.

Senator MCINTYRE. The subcommittee will come to order. We are glad to welcome Dr. Perry and General Slay again for the continuation of these hearings to evaluate and justify the requirement for cruise missile and B–52 enhancement and other matters before the Congress now. Proceed.

STATEMENT OF DR. WILLIAM J. PERRY, DIRECTOR, DEFENSE RESEARCH AND ENGINEERING; ACCOMPANIED BY LT. GEN. ALTON D. SLAY, USAF, DEPUTY CHIEF OF STAFF, RESEARCH AND DEVELOPMENT, CAPT. WALTER LOCKE, USN, JOINT CRUISE MISSILE PROGRAM OFFICER, OFFICE OF DEFENSE RESEARCH AND ENGINEERING, AND DR. HUA LIN, ASSISTANT DIRECTOR, OFFENSIVE SYSTEMS, OFFICE OF DEFENSE RESEARCH AND ENGINEERING

Dr. PERRY. Thank you, Mr. Chairman. We have with us today Dr. Lin from D.D.R. & E., General Slay from the Air Force staff, and Captain Locke from the Joint Cruise Missile Program Office.

I am sorry we had to call you back from New Hampshire for this testimony. I have to concede that this must be one of the hardest working committees in the Senate and we pay our respects to you for that.

I might note that you have kept our noses to the grindstone pretty well in the last month, also. We have been busy answering the questions from this subcommittee and this is the book which has the questions and answers in it. It was completed and submitted last week.

I had a chance over the weekend to go over the entire package and by and large the data in it is accurate and does represent the Department's views. There are in this whole set of questions perhaps four or five errors which we would like to correct before they are submitted for the record, and we will get those to you before the day is over.

[Discussion off the record.]

Senator McIntyre. Back on the record, please.

Dr. Perry. Also, I wanted to review briefly with you events in our office and in the Pentagon since our last meeting. We have continued a study of the amendments and we have a few revisions to submit. We will be discussing these with you in more detail later but I will summarize them now. There is one substantive change in which we recommend dropping the funding for cruise missile carrier from $90 million to $50 million and we will discuss with you the reasons for that proposed change.

There are four or five essentially editorial changes which have the effect of making the baseline of the amendment the latest congressional actions on the 1978 budget rather than the President's budget which was the baseline for our original amendment.

Senator McIntyre. All right.

Dr. Perry. Third, I want to bring you up to date with the fact that I signed, on August 25, which was Thursday, a new guidance to ERDA relating to the W–80 warhead which relieved them of the requirement for the SRAM–B and it also reduced the requirement for [deleted].

I have had an opportunity to review the testimony of SAC, General Ellis and his staff here on Wednesday. I will make a few general comments on that. I think the most important comment I can make is that I am substantially in agreement with most of the testimony presented here by SAC. They described the durability of the B–52, the ability of the B–52 to penetrate, with very high probability now with a gradual decline in that ability over the next 10 to 15 years. They described the synergistic effect of the mixed force.

All of those are substantive points with which we are in agreement.

There were some areas of apparent disagreement as to what is the best total number of missiles, which missiles should go with which aircraft and whether an internal or external mount is preferred. I would like to suggest that to you those are apparent rather than real disagreements and what they reflect is the difference between an operating command considering on operational plans 5, 10, 15 years hence, versus the point of view of an R. & D. and system acquisition office trying to prepare for options in that time period. The forces which we described, General Slay and I, in our testimony to you were notional forces in response to your question. Our R. & D. objective along that line will be to provide weapons which will give SAC the maximum flexibility to employ them in a variety of ways, 10 to 15 years from now. We will be happy to address that point in any detail you like.

I wanted also to bring your attention to the fact that since our last hearing, we have conducted our Defense Science Board summer study in which we assembled 25 top scientists under the direction of Dr. Herzfeld to study the question of the future of the cruise missiles.

Senator McIntyre. What was the question?

Dr. Perry. The future application of cruise missiles. We considered the SIOP applications, NATO, naval applications, we looked in some

detail at the penetrativity of cruise missiles, how that might be affected by responses of the Soviet, and what we might do about those responses and we looked at the new technologies that might apply in order to derive recommended programs in technology that were responsive to postulated changes in the Soviet air defense.

In my judgment this was an excellent study. We had a briefing at the end of the study. We expect a written report on this study in October and at that time I will be happy to send your staff a copy of that report and if you like, we will arrange for a briefing on the results. I think you will find them very interesting, and significant.

Finally, I would like to apprise you of the fact that the Secretary of the Air Force sent on the 22d of August, a proposal to the Secretary of Defense relating to the B–1 R. & D. program and relating to the FB–111H.

Fundamentally this proposal recommended that the B–1 R. & D. program be terminated in October and that we undertake a development to modify the FB–111 into a new airplane to be called the FB–111H. The B–1 R. & D. program was planned to be continued in order to maintain a production option on a new penetrating bomber. The FB–111H proposal is an alternative way of maintaining this production option.

Briefly, what is proposed is stretching the FB–111, replacing the present engine in the FB–111 with the F–101 engine which is the engine developed for the B–1, increasing the power of the electronic countermeasures over the FB–111A, and putting in modern offensive avionics. This would lead to an aircraft of approximately 150,000 pounds all-up weight it could carry [deleted] nautical miles, which is a very substantial improvement over the FB–111.

Senator McIntyre. What is the FB–111 range right now?

General Slay. [Deleted.]

Senator McIntyre. [Deleted.]

General Slay. Yes.

Senator McIntyre. You would increase to [deleted].

Dr. Perry. [Deleted.]

General Slay. [Deleted] approximately.

Mr. Smith. The gains in weapon loading would be approximately what?

General Slay. The gain in weapon loading would be up to [deleted].

Dr. Perry. Now, we will send to your staff——

General Slay. One thing I might add on that.

On the FB–111A, of that distance, a little over [deleted] miles is at low level, whereas for the FB–111H it is under B–1 ground rules with [deleted] at low altitude.

Dr. Perry. Let me put the comparison in different ways, Senator McIntyre.

Compared with the B–1, the range is the same as the B–1 but the payload decreases from 50,000 to [deleted].

So that is perhaps a different way of looking at it.

Senator McIntyre. Comparing this with the B–1 now?

Dr. Perry. Yes, sir.

Senator McIntyre. A 50,000 payload on the B–1 down to [deleted].

Dr. Perry. For the same range.

Mr. Smith. Would you please compare it to the B–52?

General SLAY. Yes, sir, I could do that. Under similar ground rules the B–52H will go [deleted] nautical miles with just [deleted] at low level. That is the H. Also I might add on the FB–111H as compared with the B–1, you finish off your tanker with FB–111 [deleted] than you do with the B–1. With the B–1 you can use up a full tanker's worth of fuel at about [deleted] nautical miles whereas on the FB–111H, since it is a smaller airplane, using less fuel, you do not finish up that tanker until [deleted] so the B–1 would have in its profile full tanks at [deleted] nautical miles from the start of the travel and the FB–111H would have full tanks at [deleted].

Dr. PERRY. We know this is a question in which you have, of course, a very high interest and we plan to send to your staff today a description of the proposed programs so that you can have more detailed information on it. In the meantime, my staff has begun intensive evaluation of the proposal. We have had several weeks with the air staff and already have had the first meeting with the contractor. We expect to have a preliminary assessment of the proposal in 2 weeks and we expect to have a final assessment in 4 to 6 weeks. That is the schedule on which we are operating right now.

Our objective, of course, is to get the technical details, program and fiscal details, so that we can certify to the Secretary not only the technical feasibility of the stretch, but also the likelihood that that change can be made within the R. & D. funding and schedule. Also whether we can verify the estimated production costs. So that program, that assessment is ongoing and will be completed on the schedule that I have indicated.

Mr. Chairman, that concludes my preliminary remarks and we are here at your pleasure to answer any questions you may have.

Senator MCINTYRE. Dr. Perry, most of the present debates in our Government about our future bomber force have conceived the issue as a choice between a force of penetrating bombers or a force of stand-off cruise missile carriers.

It seems to us that Secretary Brown's statement on August 2 to the Committee on Armed Services and your statement to this subcommittee on July 27 were heavily colored by the same conception of the problem as a choice between penetrators or cruise missile carriers.

For example, you said on July 27:

> The issue is not whether to have a bomber force but how you weaponize such a force. One option is to weaponize it with gravity bombs and short-range missiles; the other option is to weaponize the force with long-range cruise missiles which would be launched outside the Soviet Union. In the first case, the bomber is required to penetrate; in the second case, only the cruise missile must be able to penetrate. So our analysis largely revolved on which of these is able with higher confidence to penetrate the extensive air defense of the Soviet Union.

Similarly, Secretary Brown's analysis competed the B–52 cruise missile carrier against four penetrating bombers, especially the B–1, and concluded that "aircraft carrying modern cruise missiles will better assure the effectiveness of the bomber component of the U.S. Strategic Forces in the 1980's."

As you know, this subcommittee has from the first conceived the problem in quite a different way. We posed a hypothesis that "our future bomber force would be best composed of a mixed force of stand-off cruise carriers and bombers."

We have learned in these hearings that there is an impressive list of synergistic advantages which will be realized from such a mixed force. In other words, we feel it is not a question of either/or; it is a matter of both/and.

You came close to this conception of a mixed force in your July 27 statement when you said:

> Even with primary dependence on the cruise missile to penetrate Soviet air defenses, it is desirable to maintain some penetrating bombers, to maximize the problem of the defense by confronting them with a mixed threat.

Secretary Brown's statement seemed somewhat further away from this point. To be sure, he did say that "some modernized B–52's will continue in the penetrating bomber role." But this was an afterward, a footnote. He also said: "I do not believe that we should rely on the cruise missile carrier alone for the air breathing part of our retaliatory capability," but this was a concession in a subordinate clause on the way to another point.

Perhaps the mixed force we have been discussing and the force that you and Secretary Brown have in mind are one and the same. Perhaps the problem is only a matter of degree or a matter of language rather than substance. Still, it seems imperative to me that, in order for us to assess your R. & D. requests in this supplemental and indeed in order for us to assess the adequacy of your plans for the strategic bomber leg of the triad, we must have an unambiguous understanding of the administration's conception of the future bomber force.

There seems broad agreement on all sides that we will depend heavily on standoff cruise missiles. So the nub of the matter seems to be whether the administration intends to mix with the cruise missiles an effective penetrating bomber as an integral and substantial element of the bomber force for plannable future.

With that, Dr. Perry, would you define as a major R. & D. planning objective to continue to maintain an effective penetrating bomber as an integral part of a mixed force?

Dr. PERRY. Yes.

Senator MCINTYRE. What advantages do you see from a mixed force of penetrators and standoff cruise missiles?

Dr. PERRY. The principal synergistic advantages are twofold. First of all, it requires the Soviet air defense to encompass defense over the land mass of the Soviet Union and in addition, to build forward air defense which reaches out over the water approaches to the Soviet Union.

This is a very great complication to their air defense problem and requires a diversion of resources as opposed to concentrating on one or the other.

Second, in the design of some specific air defense systems, a compromise will have to be made between a system which is most effective against a bomber as opposed to a system which is most effective against a cruise missile.

If we present them with the dual threat, they will have to have a compromise design instead of being able to optimize one or the other. An example of this would be a [deleted]. In the case of the bomber, the preferred choice may be [deleted]. By having a mixed attack, we deny them the opportunity to optimize.

Senator McINTYRE. General Slay, could you add any other thoughts of your own on this question: What advantages do you see from a mixed force of penetrators and standoff cruise missiles?

General SLAY. Yes, sir, I would think one of the large advantages in addition to those mentioned by Dr. Perry with which I agree, is of course, the ability to carry large weapons for soft area targets.

Additionally, the capability of hedging your bet.

Senator McINTYRE. Capability of what?

General SLAY. Hedging on some unforeseen eventuality such as a building up of a defense mechanism that is effective against one of the two systems and not against the other. In other words, you have sort of a follow-on to what Dr. Perry said. Not only does it complicate his problem but it also assures us that we have two arrows in our quiver in the event he gets very, very smart. That is what I am saying. I feel that the ability to destroy his capability to control his defensive battle is much greater the more systems of a different type that he has to contend with.

If he is having to contend with NUDETS from SLBM's and from ICBM's that have already occurred, now he is faced with penetrating bombers using the most modern types of ECM we can put on them, using decoys, such as the B–52's now carry, cruise missiles, SRAM, all of which require different actions on his part.

I can foresee an eventuality where his entire command and control structure might break down and provide everything a much freer ride.

It is the synergistic effect I think which is paramount, as Dr. Perry stated.

Senator McINTYRE. One thing I want to pursue later relates to SAC's testimony toward the close of the day when they discussed the ways cruise missiles might be degraded in an operational situation. I want to ask some questions about that later on.

Mr. SMITH. A couple of other possible advantages to add to the list is the enhanced survivability, at least of B–52's, if you add cruise missiles to the force.

General SLAY. That was included, I believe, in both Dr. Perry's remarks and my remarks. Our analysis is the B–52 gained, perhaps [deleted] on penetrativity with the cruise missiles penetrating at the same time due to the confusion factor.

Mr. SMITH. The second one is that there might be some uncertainty about target coverage from a long-range cruise missile, given SALT limitations. This suggests questions the chairman may raise later, but that might be a candidate for the list as well.

General SLAY. No question about it, that was an oversight. That is very clearly an advantage, Mr. Smith.

Senator McINTYRE. Mr. Secretary, to put this question a little differently, what disadvantages do you see from having a force dominated either by penetrators or by the standoff cruise missiles? What disadvantages do you see in this situation?

Dr. PERRY. The disadvantages to us is it allows the Soviet air defense to concentrate on that one method of attack.

Senator McINTYRE. General Slay.

General SLAY. I believe that is the central disadvantage.

Senator McIntyre. Dr. Perry, while we are here this morning, it might be helpful to us if you would elaborate on the concept of the mixed force as you see it as of this morning.

Dr. Perry. I would start off by observing that I think our present force largely composed of B–52 penetrators is a very effective force with very high probability of penetrating the present Soviet air defense.

This is because the B–52's operational tactics and because of the ECM which they employ.

The question then is how that effectiveness will be degraded 5, 10, 15 years in the future, and how we should modernize the force to minimize the effect of that degradation.

One set of actions, we need to take simply involves improving the capacity of the B–52 penetrating bombers, and we have a set of proposals in the fiscal year 1978 program and concepts beyond fiscal year 1978 which accomplish that objective.

And a second, of course, is adding the cruise missiles to the force which present the Soviet Union air defense with a fundamentally different problem which is more effective than anything we can do by simply upgrading the penetrating bombers.

I believe that our bomber strike force will be depending primarily on penetrating bombers for 6, 7 or 8 years more. So we have a responsibility to maintain the effectiveness of that force since they will be the dominant part of that force in that timeframe.

In the meantime we will be introducing cruise missiles to the force and I should think at some time around [deleted] they will become the dominant part of the force which means that they will have the capability to create a higher damage expectancy of the target base than will the penetrating bombers.

How we proceed beyond the [deleted] which relative emphasis we would give to those two forces, I think will depend to a very great extent on how the Soviets respond, that is, how the Soviet Air Defense changes in the next 5 to 10 years. It is very difficult to predict that today. I think it is important that we maintain the flexibility to be able to go either way and I believe that the R. & D. and acquisition programs we are proposing do maintain that flexibility.

I did not want to make a statement as to which is dominant in [deleted]. It is highly defense sensitive.

Mr. Smith. Dr. Perry, the chairman's introductory remarks expressed concern about some ambiguity in earlier statements from the administration about the future bomber force. It is clear from your written answers to the committee's interrogatories and from your remarks today that you are squarely in support of the idea of a mixed force with a permanent element of it being a penetrating bomber.

Is there any other element of the administration or of the Department that differs from your clarity on this point that might impede your ability to pursue this effectively in your leadership of the R. & D. programs over the next few years?

Dr. Perry. That is a difficult prediction to make, Mr. Smith.

Mr. Smith. Just take the first.

Dr. Perry. I believe I have the support of the Secretary in this position.

Senator McIntyre. You believe you have his support?
Dr. Perry. Yes, sir.
Senator McIntyre. You do not know?
Dr. Perry. I have the support of the Secretary.
[Additional information follows:]

The Secretary of Defense believes that the bomber wing of the Triad will, at least through the 1980s and probably beyond, consist of a mixed force of penetrating bombers and cruise missile carriers. From now to the [deleted] the senior partner in this mixed force will be the penetrating bomber. From the [deleted] on, the senior partner will be the cruise missile carrier. The relative force level and effectiveness at any particular date will be determined by the specific developments in the Soviet air defense during and after this next decade, and our programs are designed to be flexible enough to respond to these developments as they unfold.

Mr. Smith. Very well.
Dr. Perry. I would want to make an additional comment on the issue of ECM with the penetrating bomber force since it has been raised as a substantive point in the decision.
We believe that ECM is a very effective assistance to the manned bomber force today and that it will continue to be as effective for some years into the future and we are proposing continued R. & D. and continued acquisition efforts in ECM.
There is a fundamental uncertainty as we look into the far future as to how the Soviets could respond to our ECM systems and our concern is that we not get too great a dependence on ECM as a fundamental means of penetrating.
Now, we are not asserting that the Soviets now have the capability or will soon have the capability to [deleted] but that is a technique which is available to us, it is a technique which they are aware of and have developed to a certain extent and we have a concern that that might become a significant development of theirs in the future.
There are other electronic countermeasures techniques which could be troublesome as well. For that reason we do not want the bomber leg of the Triad to be totally dependent on electronic countermeasures for its penetrativity. The cruise missile solution to the problem depends primarily on low radar cross section which poses a fundamentally different problem to the air defense. Therefore, as we look into the long-term future, 10, 15 years ahead, we feel that that is a more solid basis on which to base our penetrativity plans.
Mr. Smith. Dr. Perry, one last point on ECM, it was not clear in the Bomber Modernization Study or in the discussions so far in the record that the Department had fully credited the synergistic impact on bomber ECM of introducing cruise missiles into the force. You mentioned yourself, earlier this morning, that as soon as you introduce cruise missiles into your force as a major element, that will compound a SAM's ability to counter ECM. That, in itself, gives a major multiplier of the effectiveness of ECM.
This is not to counter your earlier remark but simply to note that as an element of advantage that you get from a mixed force.
Dr. Perry. I would agree with that, Mr. Smith. I think if I would summarize a statement on the mixed force it is that we believe a mixed force is important, that is the present, to the [deleted] the senior partner in that mixed force will be the penetrating bombers, and that we

would expect that in the [deleted] the cruise missile would be the senior partner.

Now, when that transition takes place and the extent to which it takes place is very difficult to predict, and what I have represented in that statement is my view on the problem and the Secretary's view on the problem.

Senator McIntyre. Has the Department decided yet how they will use the B–52D's in a mixed force?

Dr. Perry. No, that is still an option which is open for future evaluation.

Senator McIntyre. That is an option?

Dr. Perry. It is an option whether the B–52D's would be used with cruise missile carrier or remain as they are today.

More generally, Mr. Chairman, all of the force configurations which have been described to you by General Slay or by myself or by General Ellis which specified which part of the B–52 force would be used as cruise missile carrier, were prepared for planning purposes only; at this stage we have not made a decision on that.

Senator McIntyre. General Slay's postulated force used the B–52D's as standoff cruise missile carriers. The Department provided, at our request, a list of modifications which would have to be executed for the D's to be used as cruise missile carriers. Are any of those modifications supported in the supplemental bill before us?

General Slay. Mr. Chairman, in sum they are not.

Senator McIntyre. Pardon me?

General Slay. In sum, they are not. Some minor portions of the mods required are in that.

Senator McIntyre. In sum they are not?

General Slay. That is correct. I also would stress the fact that in my introductory remarks, I said that this was strictly a postulated force which may or may not bear any resemblance to the actual fact.

Senator McIntyre. Has the Department yet decided how the B–52G's would be used in a mixed force of penetrators and standoff cruise missile carriers?

Dr. Perry. Mr. Chairman, the same answer. We have a concept of how the B–52G would be used but have not made the decision that that is necessarily the best way to use the force.

Senator McIntyre. What are the alternatives, anyway?

You have the G, H, and D, is that correct?

Dr. Perry. Yes, sir.

Senator McIntyre. What are the ways you could fit them into one or the other job?

Dr. Perry. You could take the entire B–52D force and make them cruise missiles carriers only and use G's and H's only as penetrators, or you could use the B–52D as cruise missile carriers, the G's as a mixed aircraft, and H's as penetrators. Or you could use the B–52G's strictly as cruise missile carriers. And 150 B–52G's would enable you to carry 3,000 cruise missiles and so you could let the B–52G be the entire cruise missile carrier force. Our development programs at this stage are flexible enough that we can pursue any one of those variations, and that flexibility will be open to us for several years into the future.

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Senator McIntyre. We noted, during the hearings in which SAC testified, that they discussed an alternative with the subcommittee that would arm the B–52G's with 12 external long-range cruise missiles which could be launched either from a standoff distance or as the B–52 would penetrate. This alternative would also arm the G's with internal weapons similar to those currently used so that the G's could continue to be used as a penetrating bomber even after having launched their long-range cruise missiles.

Does the Department wish to exclude this alternative at this point?

Dr. Perry. We do not wish to exclude that alternative.

Senator McIntyre. They mentioned in their testimony that if this alternative were pursued, it would leave some [deleted] empty spaces in the SRAM racks of the B–52G's and H's. What provisions does the Department have in this bill or in other R. & D. programs to fill those spaces if that alternative for the B–52G's is chosen?

Dr. Perry. We are presently proceeding on a plan which would lead to a procurement of up to 3,000 cruise missiles; and if we, indeed, procure 3,000 cruise missiles, there would be [deleted] holes left in the SRAM racks. The option which General Ellis presented assumed that only [deleted] cruise missiles were procured.

Mr. Smith. Dr. Perry, once everyone has agreed that we will have a mixed force, then the next question is, what kind of mix, and this line of questioning is designed to focus on that.

Now, it is clear that the precise definition of the mix, particularly as it would use the B–52's in the near term, is yet to be determined; and as you have already said, one of the key questions is how to use the G's.

If you use the G's as SAC has postulated, you would have empty spaces in the SRAM rack; and you would, as is currently the case, lose weapons loadings as a result.

So the next question that logically follows, is what specific program do you have currently in this bill or in the fiscal year 1978 program already authorized and appropriated to fill that rack with a weapon? What particular weapons have you designed to do that if, in fact, that is an option you do not wish to exclude, which you have already said that you do not wish to exclude?

Dr. Perry. Mr. Smith, let me be more specific about it. The plan that you are describing really assumes that no cruise missiles are put internally into any B–52's and if that, in fact, happens—that is, if we do not put cruise missiles internally to any B–52's—then the present shortage of [deleted] or the present [deleted] holes that exist today will continue to exist in the future. So the solution to the [deleted] holes is to fill them up with cruise missiles, as I see it.

Mr. Smith. Would they be long-range cruise missiles?

Dr. Perry. Yes, sir.

Mr. Smith. There would be a net loss of weapon loading as a result, according to the answers to the written questions.

You currently have the capability for eight SRAM or SRAM sized weapons and four gravity weapons in the B–52 internally. However you load long-range cruise missiles, there will necessarily be a reduction in potential [deleted] whatever loading that you would postulate for a long-range cruise missile internally.

Dr. PERRY. If we put cruise missiles internally, then we can only put [deleted] internally to the B–52 as compared with the 12 that we could put in the SRAM rack and gravity bomb, that is correct.

Whether that is a good thing to do depends not simply on the count of the weapons but how effective those [deleted] would be on a target base.

Mr. SMITH. The question here is not designed to pin down which of these alternatives is the best, because, as you rightly suggest, that is something that requires a great deal more analysis by the Department as well as the Congress. The question is simply to determine whether this bill will in fact provide, as you said you wished, sufficient flexibility in research and development to protect all of these options.

One of the options, and clearly a strong one which SAC is suggesting, arms the B–52G's with 12 externally loaded long-range cruise missiles and loading internally, to get the optimum weapons loading still consistent with the penetrating mission, [deleted] weapons.

Now, the question is what research and development option do you have in this bill that protects that alternative? The SRAM–B line is closed down. The ASALM is a longer term possibility. That really leaves three alternatives, [deleted] which you propose to cancel.

Would it be plausible, Dr. Perry, to at the price of $11 million in fiscal year 1977—I am sorry, fiscal year 1978, according to the written answer to one of the interrogatories, to buy you a year's thinking space to think through that force loading and force planning problem somewhat more clearly. This would insure you would have the option of filling those empty spaces with an ALCM–A since that seems to be the only weapon of its class that would fit into a rack.

Dr. PERRY. Well, that is a matter of judgment, Mr. Smith.

I, personally, do not believe it is required to protect that option, it is an option which is easy to go to any time you want to go to it. We have two alternatives to that in the present program.

One of them is substituting the [deleted] and I believe that in many force deployments that would be a more attractive alternative.

The second alternative, of course, is the ASALM missile which will be coming along later in time. And in my judgment those two alternatives are sufficient.

Mr. SMITH. The one comes at the risk of loss of time, the other suggests the possibility of loss of weapon loading.

Dr. PERRY. Well, the cruise missile alternative presumes that at least some of the bomber force, some of the bombers in the bomber force will be launching all of the weapons in a standoff mode as opposed to the presumption that all bombers have to penetrate.

Mr. SMITH. I am sorry, Mr. Chairman, this is a rather critical point.

The SAC use of the G's would actually mix the role. I suppose, even if you load the long-range cruise missile internally, you could penetrate?

Dr. PERRY. You could penetrate; that is correct.

Mr. SMITH. In earlier hearings this year, the subcommittee examined rather carefully how our offense might beat a passive defense, an increasingly hardened industrial base. One conclusion that seemed rather self-evident is that you might need more weapons, but not necessarily higher quality weapons. So weapons loadings becomes a very important

research and development goal. The reduction of potential weapon loadings internal to the G's from 12 to say [deleted] is a most consequential matter.

Dr. PERRY. The issue, of course, still is not how many weapons are in the bomb bay but how many weapons are delivered to the targets and with what effect. And it would seem to me that with the number of gravity bombs and SRAM's which will be available, which are already available and which can be placed in the force, that the option is better served by putting cruise missiles in the internal racks of at least some of the B–52's. Those B–52's then are not required to penetrate and we may end up then with a higher damage expectancy from those [deleted] than we would get from 12 by the time they finally get to the target.

Senator MCINTYRE. I would like to examine next what research and development plans the Department currently has for a post B–52 penetrating bomber. We have had a number of rather detailed questions about the B–1 research and development program and a possible FB–111H startup. Dr. Perry, you said on July 27 that you "proposed to maintain the B–1 research and development program at some level for the next few years." Is this still the Department's position?

Dr. PERRY. This is the Department's position but we are, as I mentioned in my opening statement, examining an alternative which would effectively terminate the B–1 but we are not in a position yet to give you a recommendation on that.

Senator MCINTYRE. Let us suppose that the B–1 program is continued as prescribed in the fiscal year 1978 budget and adjusted to terminate production related tasks as a result of the recent B–1 decisions, what would be the date when the first B–1 aircraft delivery could be attained and how long from a production decision could a new IOC be achieved?

Dr. PERRY. Let me check that figure to be sure I have it for you. I have the information here.

Al, will you help me on that?

General SLAY. Yes.

There are several options. One of which would have an initial operational capability in about [deleted] which is the most optimistic option, at a cost of around $28 billion if we went the full 240 buy that we had proposed before. The options as far as holding on to the B–1 research and development technology and energy vary in cost from roughly $755 million for the low cost option up to about $1.5 billion for the high cost option. The cost does not include funds to execute the option, but merely keeps it open.

I am not sure that answers the question but those options would be——

Mr. SMITH. What would be the date of first delivery?

General SLAY. First delivery would be in 1983, Mr. Smith. The initial operational capability would be [deleted].

Mr. SMITH. That would be the same definition of IOC as in the earlier B–1 program.

General SLAY. Yes.

Mr. SMITH. Could you put it in the record when the first delivery would be achieved?

General SLAY. I will do that.

[The information follows:]

Based on a October 1, 1979, production start date, the earliest first aircraft delivery would be in early 1983. The latest first aircraft delivery would be in mid-1983 under these options.

Mr. SMITH. Off the record for a moment.

[Discussion was off the record.]

General SLAY. I was going to approximate 1983 but I will give a closer date on that.

Senator MCINTYRE. What is the 1983?

General SLAY. The first production.

Mr. SMITH. IOC would be a wing plus a support unit, is that correct?

General SLAY. That is essentially correct. It amounts to a little more than one wing and a training squadron.

Mr. SMITH. That would be about how many?

General SLAY. Sixty-five airplanes.

Senator MCINTYRE. For how long will the B–1 production option be retained, if the B–1 R. & D. program excluding production related tasks is continued as prescribed in the fiscal year 1978 budget?

Dr. PERRY. That is to a certain extent a judgment, Mr. Chairman, but in the most extensive option which General Slay referred to, it would be until 1980.

Senator MCINTYRE. Until 1980?

Dr. PERRY. 1980; some people may argue only 1979 and it gets to be a judgment as the contractor's workload decreases whether he really has the production capability but the range of estimates is 1979 to 1980.

General SLAY. Could we back up to the previous question. I can give you a better calibration of that.

Based upon the original B–1 program, from the delivery of the first aircraft to SAC, to the declared initial operational capability was 2½ years, with the February budget amendment that stretched to a little over 3 years.

So you back off from 1986 to 2½ years, first delivery would be in 1983, I would say.

Senator MCINTYRE. Thank you.

General SLAY. If those figures are in error, I will correct them with a telephone call to you today, Mr. Smith.

[The information follows:]

Based on a October 1, 1979, production start date, the earliest first aircraft delivery would be in early 1983. The latest first aircraft delivery would be in mid-1983 under these options.

[Discussion off the record.]

Senator MCINTYRE. On the record.

Now, how much money will be required in fiscal year 1979 to protect the production option for the B–1 aircraft? Is there sufficient funding in the present Air Force program for fiscal year 1979 to protect the option for production?

General SLAY. There is sufficient money to protect that option in the 1979 budget.

Mr. SMITH. How much would be required in fiscal year 1979 to protect that option?

General SLAY. It depends on which option you take, of course. It would require less than the amount that is currently in the budget, Mr. Smith, and I will provide that in the same phone call to you.

I only have it broken out in 1978 and total here. I do not have the 1979 money.

[The information follows:]

If the option to continue the current program including Aircraft 4 and production related work were selected, we would require $343 million in fiscal year 1979. If we discontinue the production related tasks, we would require $219 million in fiscal year 1979. With Aircraft 5 and 6 in the program, $278 million would be required in fiscal year 1979 not including the cost to produce these aircraft. The cost to produce aircraft five and six is estimated to be $462 million over the cost to terminate the production program and could be made available from the B–1 fiscal year 1977 procurement funds being considered for recision or by incrementally funding in R.D.T. & E.

Senator McIntyre. How much time could be gained in future B–1 production if the fifth and sixth B–1 aircraft were continued in production in fiscal year 1978. What IOC would be attained?

Dr. Perry. The IOC that was quoted by General Slay, which is [deleted] is the IOC that would be attained in that case. The advantage of maintaining five and six in production is not that you would move the IOC up, but that you would be able to maintain your option to go into production longer simply because you are keeping the contractor working on airplanes longer and the range that I gave you before from 1979 to 1980, essentially was the difference between those two cases.

The only way you could hope to keep your production option open until 1980 is by building aircraft five and six but the IOC does not change significantly either of those cases.

General Slay. That is correct.

Senator McIntyre. Can the production option for the B–1 aircraft be economically and effectively protected beyond fiscal year 1978?

Dr. Perry. It could be protected, can be protected as I indicated, by building aircraft five and six to late 1979, probably to 1980.

Senator McIntyre. That would be economically sound?

Dr. Perry. That is a judgment call, Senator, and the issue is how much are you willing to pay to keep that option open. It would cost about $1.4 billion to do that.

Senator McIntyre. $1 billion?

Dr. Perry. About $1.4 billion.

Senator McIntyre. Suppose the fifth and sixth B–1 aircraft were authorized to be produced as R. & D. aircraft and were funded incrementally. What R. & D. funds would be required in fiscal year 1978 for this effort?

General Slay. 344 million R.D.T. & E. dollars; however, this assumes that the $1,073 million appropriated for fiscal year 1977 B–1 procurement is available to complete aircraft 5 and 6.

Senator McIntyre. What are the out-year funding requirements for the fifth and sixth B–1 effort.

General Slay. It would be a total of $900 million on that option. I will break out that how much specifically for——

Senator McIntyre. You can do that with a phone call. How long will this continue to be one production option?

Dr. Perry. Until 1980.

[The information follows:]

The R.D.T. & E. program that would accompany procurement of Aircraft 5 and 6 would total $900 million in fiscal year 1978 through 1982. The fiscal year

breakout for R.D.T. & E. is $344 in fiscal year 1978, $278 in fiscal year 1979, $109 in fiscal year 1980 and the balance, $169 in the remaining two years. We would also require the entire amount appropriated in fiscal year 1977 for B–1 procurement, $1073 million. This program would complete the planned B–1 R.D.T. & E. except that effort related to production and will support a flight test program for Aircraft 5 and 6. If we exercised an option to restart B–1 production, $560 million in additional R.D.T. & E. funds would be required for production related tasks.

The cost of incrementally funding Aircraft 5 and 6 would be about $462 million, the amount of the fiscal year 1977 B–1 Procurement Recision request. The funds for aircraft 5 and 6 would be in addition to the R.D.T. & E. amounts cited above. This fiscal year breakout would be $200 million in fiscal year 1978, $205 million in fiscal year 1979, and $57 million in fiscal year 1980.

Senator McIntyre. What would be the cost to terminate this program at completion? Is this included in the total cost to build flight test, and support a fifth and sixth B–1 aircraft?

General Slay. Those do include termination costs of around $90 million, as I recall? I will calibrate that for you.

[The information follows:]

About $90 million will be required to terminate this condition. The cost is included in our estimate to conduct the R.D.T. & E. program with Aircraft 5 and 6, $900 million for R.D.T. & E. and $462 million to complete these aircraft. Since the contracts would have an end date, you would find a specific item for termination, but the individual line item costs would each include funds to phase out that activity.

Senator McIntyre. If a decision was made to terminate the B–1 R. & D. program as of October 1, 1977, what funding would be required for termination costs?

General Slay. $90 million.

Senator McIntyre. If the B–1 R. & D. program were terminated as of October 1, 1977, are there any particular areas of work such as engine development, materials development, avionics technology, or others that could be considered beneficial to future defense programs? Would the Air Force or Defense Department want to continue with these specific efforts and what would be the costs and funding required in fiscal year 1978 to cover these efforts? Can you tell me that off the top of your head?

Dr. Perry. Between General Slay and myself, we can.

General Slay. Yes, sir, I might say all of the above. There is a little in each of those areas which we would like to finish off. The R. & D. on the engine, which would cost $57 million, $38 million in fiscal year 1978 and $19 million in fiscal year 1979. We would like to continue some of the materials work, some of the avionics work, particularly as it related to nuclear hardness, and that would cost around $20 million.

So, you would add the $57 million for engine plus the $20 million for the residual tasks, and that is essentially what you have added to that. We would also like to spend about $20 million of the B–1 funds in fiscal year 1978 on strategic aircraft avionics. This work is not directly related to B–1 R.D.T. & E.

Senator McIntyre. Can you tell us what are the recommendations of the Air Force for the B–1 R. & D. program? In particular has the Air Force recommended to OSD a program to terminate the B–1 R. & D. program and initiate a prototype FB–111 program?

General Slay. Yes, sir, we have.

Senator McIntyre. What would be the effect on the Defense posture if the committee recommended termination of the B–1 development effort as of October 1, 1977, while continuing development of some essential efforts? Consider this also with and without FB–111 prototype start.

Dr. Perry. Mr. Chairman, the answer to that question is the subject of the assessments which we are now making on which we expect to have a preliminary evaluation in about 2 weeks and a final assessment in 4 to 6 weeks. We will report to the subcommittee at each of those two stages. We have had the proposal from the Air Force for only several days now and we are not in position to come to a judgment on that yet.

Mr. Smith. General Slay, there is how much in R. & D. for fiscal year 1978 for the B–1 program?

General Slay. $309 million, I believe.

Mr. Smith. 300——

General Slay. You mean in fiscal year 1979?

Mr. Smith. Fiscal year 1978.

General Slay. $442.5.

Mr. Smith. So, as I understand it, if you subtract from that $90 million for termination——

General Slay. Right.

Mr. Smith. And project $97 million more for the engine and other work that you want to continue, that is $187, so you have roughly $265 million that is at question. There seeems to be three alternatives regarding this money. One, you could continue to do some B–1 R. & D. Second, you could, after some reflection, send up a recission. Is that under consideration as one of the alternatives, Dr. Perry?

Dr. Perry. We are looking at the proposals as a package rather than breaking out alternatives in that form.

Mr. Smith. Third, some or all of it could be credited against some other important R. & D. work in the bomber leg of the Triad.

Dr. Perry. Or some combination of the two.

Senator McIntyre. If the B–1 development funding were terminated as of October 1, 1977, how long would be required to initiate and and deliver a production B–1 aicraft at a subsequent time—when could an IOC be reached?

Dr. Perry. If I understand the question right, Senator McIntyre, I believe we have answered that one. Maybe I did not understand the question.

Senator McIntyre. If the B–1 development funding were terminated as of October 1, 1977, how long would be required to initiate and delivery a delivery a production B–1 aircraft at a subsequent time—when could an IOC be reached?

Dr. Perry. This is if we terminate completely on October 1?

[The information follows:]

The last FB–111 aircraft was delivered in June 1971; the first was delivered in September 1969.

Mr. Smith. To terminate completely on October 1 but at some subsequent point change your mind: "We want the B–1." How long would it take you to start all over again?

Dr. PERRY. I am not sure that is feasible.

General SLAY. I would think I would want to put that in my "too hard file," Mr. Smith.

Mr. SMITH. So it really does boil down to a judgment that the Government must collectively make now. It is not something that can be put off?

Dr. PERRY. If the decision is made to terminate the B–1 R. & D. effort, I think you might as well forget about the option to produce B–1.

Senator MCINTYRE. We would like to take a look at alternatives to the post-B–52 penetrator, FB–111H. If an FB–111 prototype modification program for a stretched bomber production option were initiated in fiscal year 1978, when would the first modified operational aircraft be available if the production/modification decision was determined on the basis of satisfactory prototype flight test data?

General SLAY. Early [deleted] I think, Mr. Chairman.

Senator MCINTYRE. Early [deleted].

General SLAY. Yes, sir.

[Additional information follows:]

This is the earliest first delivery date; however, it is assumed that we are spending production funds while monitoring the flight test program.

Senator MCINTYRE. When was the last FB–111 aircraft delivered from production?

General SLAY. I will produce that and provide that in just one moment.

Senator MCINTYRE. When was the last major modification performed on F–111 or FB–111-type aircraft at the production facility?

General SLAY. I would have to provide that answer for the record. I will provide that in the same call to Mr. Smith this afternoon.

[The information follows:]

There have been no major modifications performed on either the F–111 or FB–111 forces.

The F–111 series of aircraft have had model changes, A–F, rather than major modifications. The last delivery dates are F–111A, August 1969; F–111E, May 1971; F–111D, February 1973; and F–111F, November 1976.

The FB–111A has had no model change and its latest delivery date was June 1971.

Changes to the F/FB–111 force have consisted mainly of replacement and minor maintenance mods.

Senator MCINTYRE. All right.

What are the costs to start up a modification or production line for a stretched FB–111 aircraft?

General SLAY. $380 million total for the prototype program, Mr. Chairman.

Senator MCINTYRE. Is there any economical or prohibitive reason why a program to stretch the FB–111 aircraft could not be competed among aircraft manufacturers internally within the Air Force capabilities?

General SLAY. Sir, I believe that we would have an extreme amount of difficulty finding anyone to compete. The experience that General Dynamics has with the F–111 would be overpowering in a competitive environment, I would think. There is also the matter of the data rights, some of which we own and some of which we do not, and we would be in rather protracted negotiations to obtain the remainder of the data rights for the stretched version. It is theoretically possible, however.

Senator McINTYRE. What are the total then-year costs including development funds, flight test, and other program development task type effort for a prototype program to stretch the FB–111 aircraft to retain a penetrating bomber option?

General SLAY. Mr. Chairman, through fiscal year 1979, it would be approximately $252 million. That would be to retain the option through fiscal 1979. To complete the program and have the R. & D. done all over, the flight test done would cost an additional $128 million for a total $380 million for the program.

[The information follows:]

There would be something under $200 million additional R.D.T. & E. funds needed subsequent to the decision to pick up the option for such things as stores, separation tests, support equipment, nuclear hardening, and added ECM gear. These funds would be spent concurrent with production in fiscal year 1980–82.

Senator McINTYRE. To embark on this program must mean your high optimum of the ability to stretch and to modify this FB–111H into a penetrating bomber?

General SLAY. Yes, it is a reasonable straightforward task.

Senator McINTYRE. How much funding would be required in fiscal year 1978 for an FB–111 stretch prototype program and how would this funding be used?

General SLAY. Of course that would depend upon how much you wanted to protect the option. You could go from a very small amount just to study it up to an amount which we consider probably an optimum amount, which is around $90 million.

Mr. SMITH. What are the other steps in that? $90 million is a reasonable maximum. What are the other smaller steps?

General SLAY. There is a $20 million step which would provide you the capability to move out at a reasonable rate.

Senator McINTYRE. What would be the estimated modification cost in then-year dollars if a decision were made to modify about 65 FB–111 aircraft?

Dr. PERRY. General Slay can give you the Air Force estimate of that. I would append to that that OSD is not at this time in a position to certify that those are the correct costs.

General SLAY. Our best estimate, and this is a program office estimate and it is an early figure, in then-year dollars is $2.267 billion.

In fiscal year 1977 dollars, that is, $1.749 billion. That is for 65 aircraft to be modified at [deleted].

Senator McINTYRE. What would be the estimated new production cost in then-year dollars if a decision were made to build about 100 FB–111 stretched aircraft?

General SLAY. That would be $4.188 billion in then-year dollars or $3.053 in 1977 dollars.

Senator McINTYRE. Could sufficient studies be conducted with $5 to $10 million in fiscal year 1978 funding to ascertain the cost, design and operational feasibility of a stretched FB–111 leading to a decision to initiate a protoype program on these aircraft in fiscal year 1979?

General SLAY. Mr. Chairman, we have not looked at that in any amount of detail. What we have looked at is something in excess of the $5 to $10, $20 million, and we found that to be a rational program. Our total fiscal year 1978 requirement is $90 million.

Mr. SMITH. Could you provide the committee at your earliest convenience some details as to what the $20 million might support?

General SLAY. Yes, I could give it to you now or provide it for the record.

Mr. SMITH. For the record.

[The information follows:]

Fiscal year 1978 effort for $20 million would consist of:
ECM Trade Studies; Structural Design Definition; Subsystem Design Definition; Develop computer simulation for crew module; Wind Tunnel Tests at AEDC; Develop Source Selection criteria and specifications for critical long lead vendor components; Structural component and material testing.

Senator MCINTYRE. What are the advantages and disadvantages of initiating a prototype development program in fiscal year 1978 on the FB–111 stretch aircraft, versus conducting studies on this program prior to a large expenditure of funds?

Dr. PERRY. The principal disadvantage of deferring has to do with the amount of money that is being spent on the B–1 R. & D. and the principal disadvantages of terminating the B–1 R. & D. before you decide to go ahead with the FB–111 is that you do not then have the option of picking up the B–1 again.

So, it would be better to make the two decisions at the same time, to terminate the B–1 and go ahead with the FB–111, if that is the decision. Those two decisions I believe should be made at the same time. And you do not want to defer those decisions for a long time, because every month you defer, you are spending money for the B–1 R. & D. at a very significant rate.

Mr. SMITH. Mr. Perry, in one of the earlier hearings you were asked about the possibility of the Congress initiating some startup money for the FB–111 R. & D. program, or providing report language that would indicate that the Congress would consider supporting a request to reprogram money from the B–1 R. & D. program, if the department felt that was the best route.

You commented briefly at that time. After some 3 or 4 weeks now of reflection, do you have anything to add to those earlier comments?

Dr. PERRY. I think that would be an appropriate action and the Department could certainly provide an intelligent program along those lines. As I indicated before, we would expect to have a recommendation on the FB–111H very early in the fiscal year, hopefully early October. So we should be able to transform that study into a more dynamic program if that is what is indicated.

Senator MCINTYRE. Is it necessary to prototype two aircraft for this program or could a satisfactory demonstration of the feasibility of this program be attained with a single prototype aircraft?

General SLAY. Well, I will speak very parochially as an ex-tester, Mr. Chairman.

I always worry when I have one of a kind because the possibility of dinging that airplane to me goes up exponentially. When you only have one, the worst will always happen.

Dr. PERRY. I concur in that judgment.

Senator MCINTYRE. I have heard the answer before.

Would any new avionics planned for a stretched FB–111 aircraft be compatible and standardized with the new avionics of the B–52 aircraft to the extent practical and possible?

General SLAY. To the extent practicable and possible. However, Mr. Chairman, the ECM would have to be tailored to the radar cross

section and the power capabilities of the FB. But to the extent feasible, we would naturally take credit and make use of the B–52 R. & D. program.

Senator McIntyre. Would the configuration and capabilities of a new FB–111 stretched aircraft be the same as the configuration and capabilities of the stretched FB–111 aircraft that was considered in the joint strategic bomber study? If not, please list specific differences in any expected new version of a stretched FB–111 with the version considered in the JSBS. That is for the record.

General Slay. For the record I will be happy to do that, Mr. Chairman.

[The information follows:]

The stretched aircraft used in the Joint Strategic Bomber Study (JSBS) is not the same aircraft. That FB–111 update was dubbed the FB–111G. The current version is the FB–111H and has greater capabilities. The FB–111H has updated offensive and defensive avionics and greater weapon carriage internally and externally to increase its effectiveness. A comparison of the two characteristics is shown below.

	FB–111G	FB–111H
Physical characteristics:		
Length (feet)	88	88
Wing sweep (degrees)	72.5/16	60/16
Width (feet)	34/70	45/70
Empty weight (pounds)	53,816	51,800
Takeoff gross weight (pounds)	122,900	140,000
[Deleted]		
Powerplant	TF–30	F–101
Engine weight (pounds)	3,890	4,305
[Deleted]		

Senator McIntyre. What operational improvements could be expected from a new FB–111 stretch aircraft as a penetrating bomber that would overcome any deficiencies noted with a stretched FB–111 aircraft on the JSBS?

Dr. Perry. That would also be for the record.

[The information follows:]

Considerable differences affecting operational characteristics exist between the FB–111G proposed in the JSBS and the FB–111H being considered now. Some of the major changes consist of: quick start time and increased nuclear hardness, providing for increased survivability; lower radar cross section and better defensive avionics, providing for increased penetrativity; a large increase in thrust (20 percent due to use of B–1 engines), providing for a factor of three increases in weapons carrying capability; better specific fuel consumption and drag reduction (with external weapons) providing for longer range and less refueling; and numerous other changes which should increase reliability and/or decrease operating cost.

Senator McIntyre. What is the air staff, I heard that for the first time when SAC was here?

General Slay. That is the great heterogenous mass of Air Force people in the Pentagon, sir.

Senator McIntyre. That is the air staff?

General Slay. Yes, sir.

Senator McIntyre. Thank you.

Would a FB–111 stretch prototype program provide a more reasonable, practical or economical penetrating bomber option than continuing the B–1 development effort?

Dr. PERRY. I would like to defer that answer until we have completed our assessment of the Air Force proposal.

Senator MCINTYRE. You can answer that for the record.

[The information follows:]

Our assessment of the Air Force FB–111H will not be completed until October 1977. The results of that assessment will be made available to this subcommittee when available.

Senator MCINTYRE. If authorization was approved to initiate a new stretch FB–111 prototype program as a penetrating bomber system, would the Defense Department or the Air Force want to continue two programs for penetrating bomber option?

Generally SLAY. I will answer for the Air Force, I think it is an either/or, Mr. Chairman, and I would like to reiterate what Dr. Perry has said previously. We think it is essential, absolutely essential that this decision on the B–1 and the FB–111 be made simultaneously. A decision to stop the B–1 R.D.T. & E. without a parallel decision to go with the FB–111H I think would put us in an untenable position.

Mr. SMITH. General Slay, is it clearly the Air Force's recommendation that that money be used to support a FB–111H startup?

General SLAY. It is clearly our recommendation that we have made just recently, as Dr. Perry stated to the Secretary of Defense, to cease the B–1 R.D.T. & E. program and pick up the FB–111H option.

We think that that is a more viable option. It is a cheaper option by far and we think it is something that will provide the necessary R.D.T. & E. program for a manned penetrating force for the future.

Senator MCINTYRE. Mr. Old.

Mr. OLD. Thank you, Mr. Chairman.

Dr. Perry, and General Slay, I certainly want to compliment you on not only the volume but the quality of the responses in general.

Dr. PERRY. Thank you.

Mr. OLD. And the time in which it was provided. It has been very helpful and I also am aware of the effort that both of your staffs went to in order to be responsive.

Continuing the FB–111 discussion, how is this FB–111H related to the request that we are now considering? Is there any direct relationship?

Dr. PERRY. No, there is not.

Mr. OLD. If you make your decision in 5 or 6 weeks, would you still be looking for some sort of action by the Congress on the 1978 budget?

Dr. PERRY. If we make a decision to accept the Air Force proposal or something close to it, we would be requesting reprograming action from the Congress for the B–1 R. & D. money appropriated in 1978.

Mr. OLD. Or one of the three options that Mr. Smith related, or a combination thereof, I guess. Is that right? The B–1 program?

Dr. PERRY. Yes, we don't envision in any case proceeding with the B–1 R. & D. program as it was originally planned. There will certainly be a reprograming action coming to the Congress describing a change in that program.

Mr. OLD. Now, if our subcommittee should end up with a line item suggesting an FB–111 study and/or design, how would that impact on your decision?

Dr. PERRY. Well, that perhaps would facilitate a reprograming action if the reprograming request related to the FB–111.

Mr. OLD. Well, would it impact on whether or not you turned off the B–1 R. & D.?

If this subcommittee said we are putting $10, $20, or $30 million against an FB–111 line item, that would open the door for reprograming requests assuming that was approved by the Congress. But would it impact on your decision to turn off the B–1 R. & D.?

Dr. PERRY. Not directly, Mr. Old. The decision would be made on an assessment of the proposal and the cost effectiveness implied in the ultimate application of FB–111H. On that basis the Secretary would come to his judgment and then make a corresponding proposal to the Congress for whatever change in the fiscal year 1978 program was implied by that judgment.

Mr. OLD. On the other hand, if it would not impact on the decision, would it be just as convenient for the Department, if this subcommittee or the Congress did not make any recommendation, for any action that the Department wanted to take on FB–111H's be included in the 1979 budget?

Dr. PERRY. The problem with that, Mr. Old, gets back to the point both General Slay and I have made relating to timing the FB–111 decision with the B–1 R. & D. program. The two should be decided, we believe, at the same time and that time should be very early in the fiscal year, like October. The consequences of delaying a decision on the FB–111H for a year would be that we would in the meantime be spending money on the B–1 R. & D.

Mr. OLD. If you want to make certain you have the option in fiscal year 1978 it is to your advantage to have a line item created in this supplemental so you could proceed with the reprograming request.

Dr. PERRY. It would seem that that would give both the Congress and the Department the maximum flexibility.

Mr. OLD. If you had this flexibility and a line item was created, how much is the Air Force going to ask to pursue the FB–111H program in fiscal year 1979? Is that one of the figures General Slay has already given us, or a portion thereof?

General SLAY. We would be asking for a total of $162 million in 1979.

Mr. OLD. Would OSD support that amount?

Dr. PERRY. We are not prepared to support that number yet.

Mr. OLD. My question assumes that you have already approved a reprograming request for 1978 money. If we approved a reprograming request for 1978, we are certainly going to want to know what you are going to ask for in fiscal year 1979 and whether the Department is going to support that amount.

If the committee creates a line item and if you take some of your fiscal year 1978 B–1 money and request reprograming against an FB–111H line, at that time this committee would want to know what you are going to ask for in fiscal year 1979 for the FB–111H.

General Slay says it is approximately $180 million and my question is, would OSD support that amount?

Dr. PERRY. At the time we evaluate the Air Force proposal and make our recommendations to Congress, the recommendations would be for the fiscal year 1978 reprograming but we would also at that time describe the fiscal year 1979 and the outyear commitments implied by that change, that is correct.

Mr. OLD. What sort of planning wedge is in the fiscal year 1979 budget?

Dr. PERRY. The fiscal year 1979 budget presently has the B–1 R. & D. money in it and that would be more than sufficient to accommodate any program we are looking at for FB–111H.

General SLAY. There is $309.6 million. Of that amount in 1979 $19 million would be required to continue the engine R. & D., which we would want to do, and $162 million for the FB–111H.

Mr. OLD. Have you given a figure, Dr. Perry, of what would be an appropriate amount for the subcommittee to consider putting against an FB–111H line in this supplemental request?

Dr. PERRY. I would think an amount of $5 million or less on the grounds that if we come in and recommend reprograming there would be sufficient funds in the B–1 R. & D. money to accommodate anything that we would propose. Therefore, there is no requirement as I see it for that amount to be large enough to encompass the program considered.

Mr. OLD. Where would you recommend we take that $5 million from?

Dr. PERRY. We had several deletions, reductions proposed, the most substantial of which was a $40 million reduction in the cruise missile carrier.

Mr. OLD. Yes, sir, you have made a recommended reduction, as I understand it, in the R. & D. request from $300.6 million down to $292.97 million and that $40 million reduction is in there. Would you want us to make the request $297.97 to give you $5 million? Your R. & D. request is only $292.97, so within your revised request would we shuffle $5 million out of one of the programs. For example, could we take it out of perimeter acquisition radar and reduce that from $10 million to $5 million?

Dr. PERRY. I would suggest that if the subcommittee thinks it is appropriate to add $5 million to the FB–111H, that it be additive to the revised request we have rather than as an alternative.

Mr. OLD. Thank you, Mr. Chairman.

Senator MCINTYRE. Thank you.

I would like to take a brief look at the post-B–52 cruise missile carrier. I understand you are revising your request for this program from $90 million to $50 million. Would you please explain the details of this revision?

What IOC does this request protect?

What would the total program cost be?

What is the unit cost per aircraft?

Should this program be considered on any rationale other than a purely military one?

Dr. PERRY. What is conceived, Mr. Chairman, is a 2-year program that would lead at the end of fiscal year 1979 to a decision as to whether or not to proceed with cruise missile carriers.

If so, what the appropriate carrier would be and how, what sort of avionics it should have.

The first phase of that program which would begin in fiscal year 1978 would be a feasibility study and a system definition study and we envision that that would come to approximately $5 million.

The second phase of that study which would begin in the second half of fiscal year 1978 would involve selecting a candidate carrier and

going through the prototype design testing, wind tunnel work and aircraft mods that are involved. We envision that that second phase would cost about $50 million of which $30 million would be required in fiscal year 1978 and $20 million in fiscal year 1979.

That second phase would also involve flight demonstrations. We have estimated $36 million for flight demonstrations, which would begin in the last quarter of fiscal year 1978 and would require an obligation of $15 million out of the $36 million in fiscal year 1978.

Now, to recapitulate, the requirement in fiscal year 1978 then would be for $5 million for the feasibility study and system definition study, $30 million for the design phase and $15 million for the flight demonstrations.

Mr. SMITH. You have $50 million in fiscal year 1978 and did I understand $41 million——

Dr. PERRY. Implied $41 million in fiscal year 1979 taking us up to the full-scale development decision.

Mr. SMITH. So what IOC would that protect if the decision were favorable to proceed to a wide-bodied cruise missile carrier?

Dr. PERRY. General Slay. I don't think——

General SLAY. We have not gotten that far in our planning, Mr. Smith.

Dr. PERRY. It certainly would be a function of which airplane was selected and what avionics were required for that airplane.

Mr. SMITH. Total program cost or the unit cost per aircraft, can you estimate that?

Dr. PERRY. Only very approximately at this stage.

We know the commercial cost of the class of aircraft we are looking at and we could make an approximation to what the avionics might cost for it, but I cannot give you a substantive figure at this date. That is what the design study and feasibility study would determine.

Mr. SMITH. Should this program be considered by the committee on any rationale other than a purely military one?

Dr. PERRY. No, sir.

Senator MCINTYRE. Let me ask, what are the candidates?

Dr. PERRY. The Candidates are the wide-bodied transports, the 747, DC–10, L–1011.

Senator MCINTYRE. What?

Dr. PERRY. 1011. L–1011 and the DC–10 and the military cargo hauler, the C–5.

Senator MCINTYRE. What about the new air bus I saw a picture of that came over from Europe the other day?

Dr. PERRY. Have you included that, Al?

General SLAY. No, sir, we have not included that but that could certainly be a potential.

[Discussion was off the record.]

Senator MCINTYRE. The subcommittee has received copies of the administration's arms control impact statement for the items in the supplemental.

1. The arms control impact statement says that "At the present stage of their development the AGM–86B and AGM–109 programs are flexible [deleted].

Dr. Perry, do you agree?

Dr. PERRY. I would like to agree and to qualify.

Senator MCINTYRE. All right, agree and qualify.

Describe how this is done technically, will you.

Dr. PERRY. We have recommended that the range and consideration be the [deleted] of the cruise missile and we also have a view as to how that [deleted] should be determined. In particular, the [deleted] we believe is the maximum range at which the missile can fly [deleted]. Some of the ranges that you have seen quoted for this missile were not computed on that [deleted] profile. There is also a question as to whether that range should include some allowance for ECM compartment on the cruise missile. So the whole question of the definition of range is a very difficult one.

Mr. SMITH. To whom did you make this recommendation?

Dr. PERRY. I made it to the Secretary and the Secretary, of course, is discussing this in the whole context of the SALT negotiations. This is a departmental recommendation, not just my recommendation.

Mr. SMITH. Is there a formal expression of this recommendation to Secretary Vance or to the NSC or to the chief negotiator that would be discreetly identified?

Dr. PERRY. I cannot identify the discreet document but I can assure you that the Department's recommendation on range was that it be the [deleted] of the missile; the debate as to how that [deleted] will be determined is still ahead of us and I have given you my view as to how that will be determined.

Mr. SMITH. Would you operate an air-launched cruise missile at sea level at the high speed [deleted] SAC's testimony suggested a different figure.

Dr. PERRY. [Deleted] is the speed that I would recommend [deleted.]

Mr. SMITH. What would be the ranges of the TALCM under such an operational configuration?

Dr. PERRY. We will have to give you that for the record.

[The information follows:]

A cruise speed of [deleted] mach at sea level, using JP–9 fuel and in absence of any operational decrements, would yield a range of about [deleted] km. Operational factors such as winds, terrain following, jinking, etc., would degrade this range by as much as [deleted].

Mr. SMITH. We have a figure here that says [deleted] kilometers for a low, low mission, meaning presumably all at the lowest altitude at [deleted]. The point is that even under that definition it is suggested there is a strong possibility the TALCM would be greater than [deleted] kilometers.

Dr. PERRY. There is a considerable degradation in range with the speed. Increasing the speed to [deleted] from [deleted] will have a significant reduction in the range. I cannot give you that.

Mr. SMITH. We have seen informally certain figures that at [deleted] takes it just under the hair of [deleted] kilometers in an all low flight profile. This suggests that if it were [deleted] that it would be somewhat above the [deleted] kilometer level.

Dr. PERRY. That could be. I would expect that could be somewhat [deleted]. That might then involve some minor adjustment of the missile to accommodate that.

Senator MCINTYRE. Are you in general agreement, Captain Locke?

Captain LOCKE. One simple adjustment, to go from the JP9 to [deleted] was calculated onto JP–4 which is standard Air Force fuel, and one will lose [deleted] percent in range by doing that. It is not quite [deleted] not necessarily [deleted] but in the ball park of [deleted]. That will get you a [deleted] percent degradation in range at low, low sea level.

So, it was total degradation of [deleted] percent of the almost [deleted] kilometers you were talking about before. That takes you down [deleted] kilometers. None of that takes into account the normal terrain of following and the defensive avoidance which can run between, well sometimes you may gain range but in general let us say you lose between [deleted] percent and up to [deleted] percent in terrain following and defense avoidance over that [deleted] kilometer optimum range that you are talking about, Mr. Smith.

So in the real world without too much difficulty, both the ALCM–B and the TALCM could be said to have capability [deleted] kilometers.

We face a similar problem when we look at much larger missiles that the Soviet Union has, that obviously have potential range capabilities [deleted] kilometers. Those missiles are deployed.

Senator MCINTYRE. Suppose a SALT range limitation on the long-range air launch cruise missiles would define range in such a way that in order to comply the TALCM (AGM–109) would need to be shortened to demonstrate that its fuel loading had been clearly reduced. Is this feasible?

Dr. PERRY. Two answers to the question.

The first is with [deleted] suitably defined I do not believe that would be necessary. And now in the feasibility question let me defer that to Captain Locke.

Captain LOCKE. Yes, sir, when it was earlier considered to put the TALCM into the existing SRAM Rotary launcher, a shorter missile, 5½ feet shorter, was both designed and tested in a wind tunnel, so we know it will fly. That 5½-foot shorter missile going at [deleted] and with JP 9 would cut the range [deleted]. So it is obviously feasible. I personally do not think it is desirable.

Mr. OLD. Thank you, Mr. Chairman. Dr. Perry, when we go to the table at SALT and talk about a [deleted] kilometer cruise missile, what does the administration have in mind? Does it have in mind a missile that is [deleted] kilometer miles after all the degradations are taken into consideration? What is the starting point?

Dr. PERRY. The Department has recommended that the [deleted] kilometers means [deleted] and I have described to you how we would go about [deleted].

Mr. OLD. OK.

Dr. PERRY. I think it is clear that in the negotiation there would be some give-and-take on that point. I, personally, have spoken with the technical delegates, our representatives, and have explained to them my view of the problem and how one would go about computing [deleted] so our team in the negotiations has been informed and is aware of the technical issues involved here.

Mr. OLD. Going back to Captain Locke's description, we might not be able to get a missile that has [deleted] kilometers. Will we be able to get one that has [deleted] kilometers?

Captain LOCKE. Yes, sir, we can also live within the [deleted] kilometers, depending upon how it is defined.

Senator MCINTYRE. What?

Captain LOCKE. We can live within the [deleted] kilometers with the two missiles that we are talking about depending upon how they define the ground rules. In my opinion the ground rules have to be applied to the other fellows, so if we start cutting sections out of the AGM–109, for example, then I would expect to see sections cut out of SSN–12's which are operational and deployed.

Mr. OLD. Thank you.

Mr. SMITH. When did you discuss this with the technical advisers to the SALT delegation?

Dr. PERRY. General Rowney was here for a visit last week and I discussed it with him at that time.

Mr. SMITH. Is there anyone——

Dr. PERRY. And Dr. Johnson was also here 2 weeks ago and I discussed it with him.

Mr. SMITH. And when you talk about definition of [deleted], you mentioned speed and altitude. Do you also incorporate in that the range degradations for terrain following or for defensive avoidance or for winds and all that whole list that SAC described to the committee last week?

Dr. PERRY. Again that is a judgment call. My judgment is that one should include the degradation for terrain avoidance, some factor for that, but not include the factor for [deleted] since that is very difficult to pin down.

Senator MCINTYRE. Well, I live in the dream world of a layman and that is a cruise missile with [deleted] accuracy.

When the SAC fellows got through the other day and mentioned temperature and weather and altitude and all that, I sort of drifted away from [deleted] accuracy. I think you would be lucky if it got within [deleted] of the target. What does this do to this idea of the [deleted] accuracy of the cruise missile?

Dr. PERRY. Senator McIntyre, I am not sure exactly what the SAC said which led you to that impression but it is my belief now, and I would be willing to debate this at any length with anyone from SAC, that we will achieve [deleted] weapon delivery with the cruise missile. Deliveries on the order of [deleted] I think are a conservative statement of the accuracies.

Senator MCINTYRE. That is what I wanted to believe. I am not sure that I was technically aware of what they were trying to show on the degradation, but it was [deleted] I thought.

Dr. PERRY. I would like to open and have General Slay and Captain Locke comment on that, also.

Senator MCINTYRE. Let me ask you this, too, as a layman again. Are we going to depend on the cruise missiles for saturation, is that going to be the secret?

Dr. PERRY. With the cruise missile, we will [deleted].

Senator MCINTYRE. I see.

Dr. PERRY. In the way they are employed.

Senator MCINTYRE. Go ahead back to it before I interrupted then.

Dr. PERRY. Al, or Walt, would you also comment on your perception of the accuracy and considering realistic views and what operational degradation might be.

General SLAY. I can certainly do it and perhaps I should delay that until after a technical discussion by Captain Locke.

Captain LOCKE. The missiles are inertially guided so they are not affected by wind or temperature. That accuracy is improved by TERCOM during flight. So the wind and temperature——

Senator MCINTYRE. Missiles can go through and hitting a gale [deleted] after being fired, it will not affect it.

Captain LOCKE. I could imagine weather situations that were so disastrous to actually knock the missile down in the same manner that airplanes are forced into crashes because of——

Senator MCINTYRE. Very severe.

Captain LOCKE. Yes, sir. As far as normal, and to be so severe to be a fluke, so under normal all-weather situations the cruise missile accuracy is not going to be affected by weather.

The range will be affected by weather. And the compensation for that as we discovered during flight tests is the [deleted].

We lost [deleted] percent range by sticking with the normal Air Force fuel. We can pick that [deleted] percent back up if we discover the degradation due to terrain following is greater than we have experienced so far by going to JP–9.

General SLAY. Mr. Chairman, you may recall a couple of presentations that I have made here where I put the committee in the place of a SIOP planner who never looks at things in the optimistic mode. He has to consider the worst possible case and you know I remarked on a couple of occasions the difficulty in figuring a target [deleted]. As an example, we are demonstrating Minuteman accuracy today much better than [deleted] nautical miles which is the SAC SIOP planning figure. They do that to be sure that an amount of conservatism is in their plan and that they can actually generate the type of damage that they are claiming.

Now, if you ask that same planner what is the demonstrated accuracy of the Minuteman, he will tell you it is something much better than [deleted]. I am sure although I do not know exactly what SAC said. If the man who was speaking to you was a SIOP planner, he was probably holding the same type of thing to be true.

I would say that that is the only answer that I could come up with. I do not think that there is any body of opinion that says that, under a given set of circumstances, the cruise missile will not get an accuracy on the order of [deleted].

I think everyone agrees with that. It is the amount of conservatism that the SIOP planner puts into that calculation. It is the same on every weapon. You might recall, Senator, that I have told you that, if you went to the FB–111 base in your State and asked the crew how accurate can you deliver a weapon, they would tell you something that is much more accurate than the SIOP plan would show and you might recall I made that comment. I would believe that this is perhaps the answer that you get.

Senator MCINTYRE. Thank you.

Go back to that question on the SALT range limitation on the long-range air-launched cruise missiles. Let's hypothetically define range in such a way that, in order to comply, the TALCM would need to be shortened to demonstrate its fuel loading has been clearly reduced. What technical difficulties might this pose for us?

Dr. PERRY. If we were to modify the TALCM to give us a reduced range?

Senator MCINTYRE. Yes.

Mr. SMITH. And do so in a way that would alter the airframe, itself. This is a hypothetical.

Dr. PERRY. Yes.

Mr. SMITH. Suppose the definition of range were different from which you have recommended, and you had picked the TALCM in the competition. Suppose you were therefore directed to shorten the cruise missile. What technical problems does that pose for you?

Dr. PERRY. I think we have a reasonable answer to that inasmuch as we have already done some tests on that. Again I will defer to Captain Locke to answer that.

Captain LOCKE. There would be no overwhelming technical difficulty if that was done as late in the program as you are talking about. It would mean we would have to go back into flight tests again with that particular short version of the missile and so it depends upon when it happens.

You would lose commonality with the sea and the ground-launch versions when you did that sort of thing, and in the case if it could be managed that those, the same shortened missile could also be used for ground launch nuclear attack in theater, from the sea also. You have got around to the version with the conventional warhead, you definitely need a larger missile. As pointed out before, the other fellows decided they need missiles that are considerably larger than our missiles to accommodate very large conventional and sometimes nuclear warheads.

Mr. SMITH. Captain Locke, we all recognize that the definition of range is quite mushy. But if you were required to shorten the airframe, would you then have to go back and reevaluate it and have a new flight test?

Captain LOCKE. First, yes, you could do it, and, second, you would have to go back to flight test. May I add one other thing? When you finish with that at that timeframe of agreed definition of fuel, within 5 years it would be meaningless. Engines would improve and we would exceed it with new engine performance.

Mr. SMITH. Or the quality of the fuel would change.

Dr. PERRY. Yes.

Mr. SMITH. Or you could operate it differently.

Dr. PERRY. Yes.

Senator MCINTYRE. Mr. Secretary, have you discussed with responsible officials in the administration whether a wide-bodied cruise missile carrier would be considered as a heavy bomber at SALT?

Dr. PERRY. Yes, sir, I have discussed it [deleted].

Senator MCINTYRE. Pardon me?

Dr. PERRY. There does [deleted].

Senator MCINTYRE. Does the administration see it as a heavy bomber in the SALT meaning of the term? If not, does the administration expect to redirect the discussions at SALT to accommodate such a cruise missile carrier even though it is not a "heavy bomber"?

Dr. PERRY. I would have to provide that answer for the record.

[The information follows:]

[Deleted.]

Mr. SMITH. That is a fairly difficult question to resolve. The Arms Control Impact Statement, if my memory serves me right, was silent on that point even though it is, in many ways, the key arms control consideration regarding your request for the wide-bodied cruise missile carrier.

Dr. PERRY. Yes.

Senator MCINTYRE. The last part of that question that you are going to answer for the record says or inquires: "If you consider it a heavy bomber in the SALT sense, then how do you differentiate it from civilian planes of the same class?"

[The information follows:]

A cruise missile carrier, if derived from a commercial airliner, would be physically distinguishable from its civilian counterpart just as the KC–135 Air Force tanker and a 707 airliner (which have similar airframes) are distinguishable from one another by external differences which are required to perform their different functions.

Senator MCINTYRE. There has been a great deal of discussion about the target coverage of a long-range ALCM if cruise missiles on heavy bombers are limited to 2,500 kilometers at SALT. We have already inquired into this matter rather thoroughly in earlier hearings and in subcommittee investigations but a few questions remain.

If we are to depend on a mixed force for the foreseeable future, what percentage of the target base will the penetrating bomber element of that force be able to reach?

Dr. PERRY. [Deleted], Mr. Chairman.

Senator MCINTYRE. [Deleted.]

Dr. PERRY. The penetrating bomber force could reach [deleted]. The issue is whether the cruise missiles could reach [deleted].

Senator MCINTYRE. SAC in their hearings discussed the possible use of the B–52G's with 12 externally loaded long-range ALCM's and [deleted] or so internally loaded gravity bombs and SRAM's or other weapons compatible with an SRAM rack.

They postulated that these B–52G's could be used in a mixed role in which they would penetrate to some degree before launching their long-range cruise missile and then proceed as a penetrating bomber after having done so.

What percentage of the target base would this portion of a mixed force be able to reach with their long-range cruise missiles?

Dr. PERRY. If I understand the question——

Senator MCINTYRE. Do you want me to read it again?

Dr. PERRY. Let me try answering it and see if it seems that I do.

The cruise missiles from the standoff position would have access to approximately [deleted] percent of the target base if they launch [deleted].

Once the launch has taken place and the airplane penetrates then it is a question of whether the plane now has sufficient range [deleted]. The disadvantage of this mixed aircraft is that because it is carrying the cruise missiles externally, it is going to have a reduced range [deleted].

General Slay, would you want to comment further on that?

General SLAY. I understood the question a little differently. I believe what the chairman implied was in certain areas, given defenses that would allow, if the B–52 carrying its load of cruise missiles internally

to retain its penetrativity, would penetrate a certain distance, then launch its cruise missiles, would that not give you full coverage and the fact is that it [deleted].

Dr. PERRY. Of course.

Senator MCINTYRE. Penetrate.

Mr. SMITH. It would penetrate further than the [deleted].

They provided the committee two representatives, I should say, postulated sorties in a mideighties SIOP, one of which came from [deleted] before launching their long-range cruise missiles which meant that their target coverage was greatly expanded.

Then SAC contrasted that with the same weapons loading coming from [deleted] and in that case, similarly, they had very wide target coverage.

So your reaction to that would be similar, that the target coverage would be [deleted] with that kind of a sortie.

Dr. PERRY. That is correct.

Senator MCINTYRE. Mr. Old.

Mr. OLD. Thank you, sir.

Dr. Perry, we have heard a rumor that the Office of the Secretary is going to ask the Air Force to give up some SRAM's. Is there anything to that?

Dr. PERRY. I have not heard that rumor.

General SLAY. No, sir. Well, I heard the rumor but it did not come out that way in the final documents that I have seen. I have not seen anything officially on that, Mr. Old.

Mr. OLD. How would something like that come out? Would it be related to what the Office of the Secretary felt it could support in the outyears for the Air Force and certain weapons systems?

Dr. PERRY. I can conceive of no rationale behind it.

Mr. OLD. Nor can we.

General SLAY. We have the weapons, they are there. As Dr. Perry testified there are [deleted] holes now, so it would not make any sense to reduce it still further.

Mr. OLD. So far as you two gentlemen are concerned, there is nothing, you do not know of anything.

Dr. PERRY. All I can testify I am not aware——

Mr. OLD. It would not be in your area anyway.

General SLAY. The same thing here, I have heard that rumor here, but I have seen nothing concrete to that effect.

Mr. OLD. In commenting on Mr. Smith's earlier question about the [deleted] Dr. Perry responded that maybe in fact you could get by with less, you would accept the reduction of however many missiles that would be, if you went to the ALCM–B and you would have a short fall in the racks. I believe you indicated, well, you did not necessarily agree, that the job could not be done with that number.

Dr. PERRY. No, I was simply suggesting that the deficiency could be made up with ALCM–B's instead of with ALCM–A. I think that was the discussion I was having with Mr. Smith.

Mr. OLD. But you cannot carry [deleted] as I understand it. You are still going with [deleted] in the airplane that you do not have a [deleted].

Dr. PERRY. If one carries ALCM–B internally and if we procure the 3,000 or so that we are discussing, then that would fill up all of

the holes. That is a way of doing it. What we were debating was whether that was the best way of doing it.

Mr. OLD. That same aircraft loaded could carry more ALCM–A's than B's, could it not?

Dr. PERRY. No, the issue was if you put ALCM–A in the SRAM rack instead of ALCM–B you also carry [deleted] if that is the choice.

Mr. SMITH. Dr. Perry, there are several calculations that I think are relevant to that judgment. First, you are giving up gravity bombs in order to get the same damage on an area target. So you have to spend [deleted] arriving on target [deleted] arriving on an area target.

Second, for every G that you transform into a standoff cruise missile carrier, you have to make some sort of an adjustment for the reduced efficiency of the use of the weapons for damage that you would otherwise effect in damage assessment strikes. I do not know what that factor is but there is some factor there.

Third, you are losing roughly [deleted], perhaps [deleted] weapons loadings in just that subset of your mixed force—the internal loadings of the G's. When you move to an internally loaded long-range cruise missile and substitute that load of [deleted] for what could be [deleted] internally loaded gravity bombs or SRAM's or ALCM–A's.

All of this means that when you examine your point that the key indicator is weapons on targets, then the burden of proof for your analyst is that the ALCM–A's, SRAM's and gravity bombs internally loaded on the B–52G as a dual role aircraft will be so much less survivable than long-range ALCM's to make up a difference of [deleted] weapons. This is a fairly large burden of proof.

So the question now seems to be whether you want to defer the judgment about filling the racks with ALCM–A's or implicitly decide that those numbers of weapons loading are not that important by closing the ALCM–A option.

Dr. PERRY. You have stated very clearly the issue which you raised earlier in the discussion and I understand the point you make.

My response to it is the same now as it was then.

Mr. OLD. So, Dr. Perry, at this moment there is no intent on the part of OSD to revise the ALCM–A decision?

Dr. PERRY. That is correct.

Mr. OLD. OSD does not feel that there is a requirement here for two missiles, one short and one long?

Dr. PERRY. We think we can meet the requirements with just the one missile.

Mr. OLD. Well, in response to a question posed by Senator Goldwater on why ALCM–A is not required if the B–52 will continue to be used as a penetrator, you stated that: "The ALCM–A is not required on a B–52 penetrator since we judge that it would provide no significant benefits above those available from present penetrating bomber weapons."

What are the present penetrating bomber weapons to which you refer?

Dr. PERRY. The benefit of the ALCM–A on a penetrating bomber would be that it could reach out for targets [deleted] miles from its flight path.

That is a real benefit. But if you have long-range cruise missiles that are already providing that reachout effect. It seems like it is a redundant benefit.

Mr. OLD. Well, on a pure penetrator, for example, on the H, you would envision no cruise missiles?

Dr. PERRY. That is correct, I guess that is the definitions of "pure penetrator."

Mr. OLD. So the pure penetrator is not going to need a cruise missile to help it get to its target?

Dr. PERRY. We envision the pure penetrators as having SRAM's and gravity bombs and at some later date ASALM's.

Mr. OLD. So the ALCM–B is only going to be on the standoff B–52, not the penetrating B–52's?

Dr. PERRY. With the exception of the one point that Mr. Smith made earlier, that one could weaponize the B–52 entirely with cruise missiles and you might still decide to penetrate it a [deleted] to get a greater reach. So there is that inbetween case.

Mr. OLD. In the force you visualize, how then are we going to attack the more highly defended targets?

Dr. PERRY. They will be attacked by [deleted].

Mr. OLD. Any order of priority there?

Dr. PERRY. No.

Mr. OLD. We did observe in comparing the two hearings, the one where——

Dr. PERRY. Excuse me, Mr. Old, the reason I hesitate on that question, it is a function of what time you are talking about, whether it is 1982 or 1985 or 1987. And, as you proceed in time and as the defended targets become more effectively defended, then the present generation cruise missiles will not be suitable for going into the heavily defended areas. In that case one is either going to need improved second-generation cruise missile or an ASALM to take the place of it or an SRAM——

Mr. OLD. Carried by an improved penetrator?

Dr. PERRY. Pardon?

Mr. OLD. You said, or an SRAM, which would be carried by an improved penetrating bomber.

Dr. PERRY. It would be carried by whatever our penetrating bomber was at the date we are talking about. We believe and SAC testified also that we think the B–52 is going to be a penetrating bomber for a good many years.

Mr. OLD. I want to comment on a comparison between the two hearings, the one where you and General Slay appeared and the one were General Ellis and his staff appeared. I made the observation that the OSD seems to visualize the future strategic force as one where the cruise missiles seem to be primary, in a leading way, as compared to the Strategic Air Command which visualizes a force where the penetrator is the primary force with the cruise missile a a complementary or secondary force. Do you have any comment on that?

Dr. PERRY. The administration's view is that the cruise missile will be the senior partner of the two from the mideighties on.

I think SAC quite rightly is thinking about the present situation and the near-future situation and it is probably premature for them to come to some judgment about the cruise missile entering their operating plans and becoming primary.

Mr. OLD. Just one final question related to the Joint Strategic Bomber Study and the Modernization of the Strategic Force Study.

Related to the cost analysis as used in the two studies, you indicated in one of your responses that the cost comparisons in the two studies were the same. Yet in what I will call the Brown study, there is a cost chart which used a 10-year cost comparison. Because of that the chart was more favorable toward the B–52 and/or to the cruise missile carrier force. However, if you used the 20-year cost curve, the result was more favorable toward the B–1.

It is a matter of judgment, I guess, which one of those cost lines you wish to use. On a day-to-day alert and on a generated alert, I believe it was——

Dr. PERRY. Yes, sir.

Mr. OLD [continuing]. You indicated in a response to one of our questions that the cost comparisons in the two studies were the same. I did not recall that JSBS used the 10-year cost line. In fact, I thought Mr. Walsh told us that he had that added in, in the most recent study. Are you aware that the two studies actually did use the same cost basis?

Dr. PERRY. General Slay, could you comment on that question?

General SLAY. I was trying to search my mind. I certainly recognize the first part of Mr. Old's question about the 10 versus the 20. But the remainder I just have to go back and check, Mr. Old. I do not recall.

Mr. OLD. Well, it is very important. It seems to me that the Secretary indicated one of his concerns was about the cost of the B–1 program and if you look at this cost chart and you are using the 20-year cost line, it is more favorable toward the B–1, but if you use the 10-year line, it is more favorable toward an alternative system, then it kind of makes a difference whether or not you say that the JSBS used the same cost comparisons.

I am not convinced that the JSBS did use the same cost comparisons since the JSBS ended up by saying that the B–1 force was the most cost effective force. If you would please clarify your response to that particular question.

Dr. PERRY. Well, we will look at the question, Mr. Old. It sounds as if we have not given the question sufficient attention and we will see if we can amend that to make it more accurate by reviewing the JSBS study.

[The information follows:]

The Joint Strategic Bomber Study did not use a ten or twenty year steady state cost for its postulated forces. The methodology used was to accumulate all costs including R.D.T. & E. procurement, and operating and maintenance, over the fifteen year period from fiscal year 1975 to 1989. In the case of the B–1, this amounted to steady state operation with the full force for the period 1986 to 1989.

Mr. OLD. Thank you, Mr. Chairman.

Senator MCINTYRE. What are we saving, Mr. Secretary, by canceling the ALCM–A, in money, this year?

Dr. PERRY. I am hesitating, Mr. Chairman, because it is a question—do you mean in fiscal year 1978 or for the whole program?

Senator MCINTYRE. For fiscal year 1978 what are we saving?

Dr. PERRY. What is the figure on that?

General SLAY. We are saving about $20 million total.

Senator MCINTYRE. When I first heard of this, I assumed that this was because of the new concept of the stand-off carrier, as opposed to the penetrator, because I recall distinctly in General Slay's first testimony the weaponization, of the strategic bomber. He said the ALCM–A was a weapon that could, I think you described it, in time could be fired [deleted] miles and come in and attack the target [deleted].

General SLAY. That is correct.

Senator MCINTYRE. It does seem kind of strange. If you are going to develop an ALCM–B, the two technologies would run—it seems to me as a layman, together.

Would this [deleted] situation we are facing with ALCM–A make it look like it might be worthwhile?

Dr. PERRY. Let me comment a little further on that, Mr. Chairman.

There is a complicating issue which I don't quite know how to resolve if we proceed with the ALCM–A, in that it is going to complicate the competition we are trying to conduct. It may even be considered by some people to prejudice the competition we are going to conduct; second, if we proceed with the ALCM–A as our short-range missile, and the competition selects the Tomahawk, as the long-range missile, then we have introduced a degree of noncommonality into our forces. I think it is undesirable. It seems to me we would be better off proceeding with the competition on the long-range cruise missiles; then, having make that determination, if we want a short-range cruise missile, we can get that with either the ALCM or Tomahawk design with a fairly simple and straightforward modification. I believe we can bring it into the force just a year or so later but I do believe it is going to complicate the programmatic aspect of the cruise missile competition if we try to develop ALCM–A the next few years.

Senator MCINTYRE. That is a good point. It could prejudice competition.

Well, any further questions, Mr. Old? Mr. Smith?

Mr. SMITH. General Slay, if the FB–111H prototype program is chosen, when would any production decision have to be made?

General SLAY. It depends upon your definition of "have to," Mr. Smith. We are looking toward an October 1, 1979, date for the decision.

Mr. SMITH. That would be the earliest production decision date and the latest would be when?

General SLAY. Whenever you wanted to make it. That would, of course, cost you more, the longer you wanted, the more months you add on to your cost for retention of the option. You ask why we selected October 1, 1979—purely circumstance. That seemed a good date to pick.

Mr. SMITH. Is the ASALM a cruise missile, in your view?

General SLAY. Yes, it is.

Mr. SMITH. Does it fit under the definition of cruise missiles, presuming that there is such a definition, which has been reportedly agreed to at the SALT negotiations?

General SLAY. Yes, it does.

Mr. SMITH. Are the U.S. SALT negotiators fully aware of ASALM's planned capabilities and have they been taken into account in developing our negotiating position?

General SLAY. I can't answer that.

Mr. SMITH. Have you discussed that?

Dr. PERRY. They are aware of the existence of the ASALM.

Mr. SMITH. Does the——

Dr. PERRY. I should clarify when I say "they," I mean the technical Defense Department representatives on SALT with whom I have had discussions.

Mr. SMITH. Does the FB–111's dependence on General Dynamics which you discussed earlier, General Slay, have you at their mercy when you come to contract negotiations?

General SLAY. It depends upon how smart we are, Mr. Smith. We certainly do not consider that we are at their mercy by any means.

Mr. SMITH. General Slay and Captain Locke had a discussion before the subcommittee in April concerning the management of the cruise missile program by the Joint Cruise Missile Program Office. Can you give the subcommittee similar assurances about the responsibilities of that office and Captain Locke in the technical and fiscal management of that program, as you did last April?

General SLAY. Yes, I did.

Mr. SMITH. Dr. Perry, you were asked by Mr. Old regarding the very important issue of whether you would expect our operators to depend on the ALCM's penetration directly without a SRAM as a precursor or not. You answered, as I understood it, that it would change over time. One written interrogatory asked how many and what percentage of the long-range ALCM's in that postulated mix force, which would have been the mid-1980's, will depend on defense suppression by SRAM's carried by the penetrationg B–52's. Your answer generally was, SRAM would be used against [deleted] targets and ALCM would be used against [deleted] targets.

On [deleted] targets, on sufficient [deleted] SRAM would be used to [deleted] opening the way for ALCM or gravity bomb-weapon delivery.

So, is your answer consistent with your judgment today that the ALCM would or would not depend on the SRAM [deleted].

Dr. PERRY. I think, Mr. Smith, it would help clarify the situation if I were to rewrite the interrogatory taking into account time phasing considerations.

I think it oversimplified to the point of obfuscation of the issue trying to treat it without taking time into account.

Senator MCINTYRE. Do you gentlemen have any closing remarks you would like to make?

Dr. PERRY. We thank you very much for your courtesy.

Senator MCINTYRE. Mr. Secretary, and General Slay and Captain Locke, we, of course, appreciate your patience and your excellent answers to these difficult questions.

I have additional questions which I will submit for the hearing record.

[The questions follow:]

Question. Please provide the following data relating to the B–1 program if (a) the R. & D. program is continued as currently outlined as a result of the B–1 amendment; (b) if a 5th and 6th B–1 aircraft were authorized in R. & D. in fiscal year 1978; (c) if the 5th and 6th B–1 aircraft were authorized in production in fiscal year 1978; and (d) if the B–1 R. & D. program were terminated as of Oct. 1, 1977 excepting for continuation of certain technical efforts that may be desired; (1) R. & D. and procurement funding requirements for fiscal year 1978 and 1979; (2) when the production effort could be initiated; (3) when the first operational aircraft could be delivered; (4) when the IOC date as previously planned for the B–1 program could be reached; (5) what the total program cost would be; (6) and what the program unit cost would be?

Answer. If the B–1 program is continued, as currently outlined as a result of the B–1 amendment, near term R.D.T. & E. funding levels would remain unchanged at $442.5 million in fiscal year 1978 and $343.0 million in fiscal year 1979. In order to maintain the program within these funding levels, some work would be slipped to later years.

The Air Force has assumed for programmatic purposes that production could be re-initiated on October 1, 1979. Based on that date, the first aircraft would be delivered in mid 1983, with Initial Operational Capability occurring in late 1986. Total program cost would be approximately $27.7 billion for 244 aircraft, with a unit cost of $133.5 million.

If a 5th and 6th B–1 aircraft were authorized in R. & D. in fiscal year 1978, the required funding would be approximately $544 million in fiscal year 1978 and $483 million in fiscal year 1979. At these levels, no production-related development tasks are included. B–1 fiscal year 1977 and prior procurement funding of $698 million is assumed to be available. Again, October 1, 1979 was assumed to be the production start date. First aircraft delivery would be in early 1983 with Initial Operational Capability occurring in early 1986. Total program cost would be approximately $28.8 billion or $116.0 million for each of 244 aircraft.

If a 5th and 6th B–1 aircraft were authorized in production in fiscal year 1978, R.D.T. & E. funding requirements would be $344 million in fiscal year 1978 and $278 million in fiscal year 1979. This option assumes that the B–1 procurement funding of $1,083 million which was authorized and appropriated for fiscal year 1977 would be available. The recision request for $462 million currently pending before the Congress would have to be withdrawn or denied. The first delivery, Initial Operational Capability, and program costs would be the same as those for the option with the 5th and 6th aircraft in R.D.T. & E.

If the B–1 program were terminated as of October 1, 1977 with the exception of continuation of certain technical efforts that may be desired, R.D.T. & E. funding of $168 million (including $90 million termination charges) in fiscal year 1978 and $19 million in fiscal year 1979 would be required. This program continues with B–1 technology that has application to other aircraft such as hard core computer memory, solid state power controllers and advanced manufacturing technology. Engine development would be continued to improve propulsion technology as well as extend the life and durability of the F–101 design. Some avionics work with application to strategic systems would also be funded.

All the funds discussed in the foregoing are in then year dollars.

Question. Please provide the following data relating to an FB–111 stretch modification and/or new production program if (a) funding of $90 million was authorized in fiscal year 1978 to initiate prototype development of FB–111 aircraft; (b) if $20 million was authorized in fiscal year 1978 to initiate a prototype development program of FB–111 aircraft; (c) and for the modification of 65 FB–111 aircraft and new production of 100 FB–111 aircraft; (1) R. & D. and procurement funding requirements for fiscal year 1978 and fiscal year 1979; (2) when the modification/production effort could be initiated; (3) when the first operational aircraft could be delivered; (4) when the IOC date similar to that previously planned for the B–1 program could be reached; (5) what the total program cost would be and (6) what the program unit cost would be?

Answer. If R.D.T. & E. funding of $90 million were authorized in fiscal year 1978 to initiate a prototype development of an improved FB–111 aircraft, $162 million would be required in fiscal year 1979. The first prototype aircraft would be delivered in late 1979 and the total program cost for 2 prototype aircraft would be approximately $380 million.

If R.D.T. & E. funding of $20 million were authorized in fiscal year 1978 to initiate the prototype development program, $140 million would be required

in fiscal year 1979. The first prototype aircraft would be delivered in mid 1980 and the total program cost for 2 prototype aircraft would be approximately $395 million. If an affirmative production decision were made, an additional $195 million in R.D.T. & E. funding would be required in both programs for production and deployment related activities.

Under the first situation I discussed, $90 million in fiscal year 1978, we could be ready to start a modification or production program as early as October 1, 1979. The first aircraft would be delivered in early 1982. In a modification program, we would probably choose a low rate of about 2 aircraft per month, and thus would have an Initial Operational Capability in late 1983. In a production program, a higher rate of 5 aircraft per month could be achieved, with an Initial Operational Capability of early 1983.

The Air Force estimate for the program cost to modify 65 aircraft would be about $2.8 billion or $42 million per aircraft. The program cost to produce 100 new aircraft would be about $4.8 billion or $47 million per aircraft.

Again, the funds discussed are then year dollars.

Question. Please provide the following data relating to a Cruise Missile carrier if (a) $90 million was authorized in fiscal year 1978 to initiate tests design, and demonstration of the Cruise Missile carrier concept; (b) if $50 million was authorized in fiscal year 1978 to initiate tests, design and demonstration of the Cruise Missile carrier concept; and (d) if the production of aircraft were to follow these conditions; (1) R. & D. and procurement funding requirements for fiscal year 1978 and 1979; (2) when the production of these Cruise Missile carriers could be initiated; (3) when the first operational aircraft could be delivered; (4) when the IOC date could be realized for these aircraft; (5) what the total program cost would be; and (6) what the program unit cost would be?

Answer. The cruise missile carrier program we are suggesting provides for studies, testing, and initial design. It would lead to a full scale engineering development decision. Until the aircraft and force structure are better defined, discussions of total progams costs and schedules would be opinions at best.

A $50 million program in fiscal year 1978 would fund system definition studies and procure two each of ALCM's and TALCM's and five each simulated models for jettison tests. One or more wide body test aircraft would be acquired through a lease or bail arrangement and the aircraft modification and launcher development started. Depending upon which CMCA contractor is selected and the degree of modification required, flight test activity may be initiated in fiscal year 1978. This demonstration would be continued in fiscal year 1978 with $41.2 million leading to a possible DSAR II review in October 1979.

Question. What is the planned armament for the B–52H? Is it as shown below:

	MK–28	SRAM	Long-range Cruise missile weapons per A/C	Total weapons for A/C type
B–52G	[Deleted.]	[Deleted.]	12/1, 800	[Deleted.]
B–52H			0/	
[Deleted]			1, 800	[Deleted.]

It would appear that:

(*a*) you are short approximately [deleted] SRAM or SRAM-sized weapons (such as ALCM–A's) (based on: [deleted] SRAM UE=[deleted] Short Fall);

(*b*) any plan to carry long-range cruise missiles internally on B–52G's or H's exacerbates this problem in that for each MK–28 that is downloaded, [deleted] cruise missiles are required to provide the same effective target coverage. In light of this, what plans do you have to provide additional SRAM-sized stores?

Answer. The bomber force we envision includes the B–52D/G/H and the FB–111. The B–52D/G/H currently carry gravity weapons and the B–52G/H's also carry the SRAM missile. Initially, we will modify the B–52G for cruise missile carriage. It can carry twelve cruise missiles externally with gravity weapons and SRAM internally, or it can carry an additional eight cruise missiles internally (replacing the SRAM and bombs). The B–52D/H and the FB–111 will be retained

in the penetrating role. Full target coverage potential of the bomber force will remain due to the ability to employ penetrating B–52's against the deeper targets that a potentially range constrained cruise missile cannot reach.

The Air Force is also pursuing development of ASALM to increase the penetrativity of the bomber force and provide growth potential for an air-to-air capability. Current concepts call for ASALM to be compatible with the SRAM rotary launcher.

Senator McIntyre. With that, we will stand in recess.

[Whereupon, at 12:35 p.m., the subcommittee adjourned.]

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