There's no subtlety about Swedish policy. Its government wants its corporations to sell as much as possible in tolerant America, while it deals with nations seeking to destroy Americans physically and philosophically. Philanthropy now means profits later. After aid comes trade. Thus last May, Swedish trade delegations played ping-pong with Fidel Castro himself. It was a public exhibition.

Only the Americans failed to notice.

And when Marxist President Allende of Chile ordered the seizure of the Ford assembly plant there, he urged the Volvo corporation to come in and operate it.

As for mainland China, the Swedish industrialists have been dealing with Peking for years. There is much more, ideologically as well as financially. So much so that even the New York Times, which has denounced American longshoremen as "loutish," commented recently that "apparently the risks of offending Washington and Moscow are weighed on different scales in Stockholm."

The point being Swedish neutrality—when it comes to the U.S., Sweden's government is more neutral than ever; when it comes to the Marxist world, Sweden's neutrality is so much less neutral than it is against the U.S.

Thus at a time when American unemployment has hit our auto, aerospace and steel industries, America is buying the merchandise which helps kill more jobs, by the thousands, and which puts dollars in the hands of the military enemy, by the millions.

Competition from abroad is tough enough. The Japanese are selling some 600,000 cars annually in the U.S.—costing us about 150,000 jobs by President Nixon's measure. At least the Japanese are America's allies. Japan has been a powerful American military base.

NADER'S SLAPDASH REPORT

HON. BOB WILSON

OF CALIFORNIA

IN THE HOUSE OF REPRESENTATIVES

Thursday, October 14, 1971

Mr. BOB WILSON. Mr. Speaker, Ralph Nader has struck again with his usual measure of half-truth and distortion in his attack on water development in California. I know my House colleagues will find the following editorial by Henry J. Mills, general manager of the Metropolitan Water District of Southern California, of interest and wish to share his thoughts in the August issue of Aqueduct News with my House colleagues at this point:

NADER'S SLAPDASH REPORT

(By Henry J. Mills)

The recent report by Ralph Nader on water development in California was a great disappointment. I think my feelings are best stated by repeating here what I told the press at the time the report was released. . . .

Nader's people who prepared this report have no understanding or appreciation of what water development has meant to Southern California.

The fact is that this semi-arid region with a population now of more than ten million people could not survive without the water that has been brought from the Owens River and the Colorado River over the years. Moreover, it must have water from Northern California to make up for the inevitable loss to Arizona of half its current supply of Colorado River water as well as to meet the needs of a still growing population.

Unfortunately, the Nader report can only be termed a highly irresponsible and slapdash compilation of inaccuracies, untruths, malicious rumors, unsupported charges, distortions and headline-hunting generalizations.

In other investigations he has conducted, Mr. Nader has made significant contributions to the welfare of the American people. However, this report on water in California was done in haste and with blinding prejudice. It is a great disservice to the people of Southern California.

AMTRAK—NO

HON. JOHN J. DUNCAN

OF TENNESSEE

IN THE HOUSE OF REPRESENTATIVES

Thursday, October 14, 1971

Mr. DUNCAN. Mr. Speaker, according to reports Congress will soon be hit with a request for an additional $160 million or more to finance operations of Amtrak, the Government-backed effort to preserve rail passenger service between "key" cities.

You will recall that the Congress originally gave Amtrak $40 million directly, and made a provision for an additional $100 million in Government loans.

At the beginning the National Railroad Passenger Corporation, later called Amtrak, predicted a rosy future. It was obvious from the beginning that political consideration was given in the selection of some routes served. This is not a way to run a railroad.

Amtrak started by cutting the number of daily trains almost in half—from 360 to fewer than 200; and things have grown worse.

At this point I do not plan to vote for additional funds for this organization, and I hope my colleagues will not either.

A LESSON IN LIFE

HON. MANUEL LUJAN, JR.

OF NEW MEXICO

IN THE HOUSE OF REPRESENTATIVES

Thursday, October 14, 1971

Mr. LUJAN. Mr. Speaker, I would like to bring to my colleagues' attention, the following letter that was received from one of my constituents, Mrs. Dorothy S. Jacobs, administrator, Maulsby Nursing Home, Clayton, N. Mex. I believe the letter speaks for itself:

A man with a large family to support, hard times, and an old father who was ill and required care as well as food, decided to take his father to the mountain to die. There no one would have to see if wild animals devoured him, or if he succumbed to the chill winds.

He loaded his father into the wheelbarrow, and with his eight year old son started the journey. About half-way up the mountain, the child said:

"Father, I'm glad you brought me along. Now, when you get old I'll know what to do with you."

Whereupon, the man turned around and re-traced his steps to his home, returning his father with him."

SENATE—*Friday, October 15, 1971*

The Senate met at 11 a.m. and was called to order by the President pro tempore (Mr. ELLENDER).

PRAYER

The Right Reverend Monsignor Patrick J. Ryan, major general, U.S. Army, retired, former Chief of Army Chaplains, Washington, D.C., offered the following prayer:

O Almighty God, Father of all mankind and Judge over nations, we ask You to bless our Nation and all its citizens. We ask You especially to bless this august body of lawmakers as they convene today.

Let the light of Thy divine wisdom direct their deliberations and shine forth in all the proceedings and laws framed for our rule and government so that they may tend to the preservation of peace, the promotion of national happiness, the increase of industry, sobriety, and useful knowledge, and may perpetuate to us the blessing of equal liberty.

Give them the wisdom and the courage to continue to stand as free men ought to stand. Guide them in their deliberations, bless them with Your counsel that all their endeavors may begin with You and through You be happily ended. Amen.

MESSAGES FROM THE PRESIDENT RECEIVED DURING ADJOURNMENT

Under authority of the order of the Senate of October 13, 1971, the Secretary of the Senate received the following messages from the President of the United States:

A message transmitting the nomination of Scott P. Crampton, of Virginia, to be an Assistant Attorney General.

A message withdrawing the nomination of Michael K. Lyons, of New York, to be a Foreign Service officer of class 8, a consular officer, and a secretary in the diplomatic service of the United States of America, which was sent to the Senate on July 28, 1971.

REPORTS OF A COMMITTEE SUBMITTED DURING ADJOURNMENT

Under authority of the order of the Senate of October 13, 1971, the following bills were reported on October 14, 1971:

By Mr. FULBRIGHT, from the Committee on Foreign Relations, without amendment:

S. 748. A bill to authorize payment and appropriation of the second and third installments of the U.S. contributions to the Fund for Special Operations of the Inter-American Development Bank (Rept. No. 92-395); and

S. 2010. A bill to provide for increased participation by the United States in the International Development Association (Rept. No. 92-396).

By Mr. SPARKMAN, from the Committee on Foreign Relations, with amendments:

S. 749. A bill to authorize U.S. contribu-

tions to the Special Funds of the Asian Development Bank (Rept. No. 92-397).

MESSAGE FROM THE HOUSE

A message from the House of Representatives, by Mr. Berry, one of its reading clerks, informed the Senate that Mr. STEIGER of Wisconsin had been appointed as a conferee at the conference on the bill (S. 2007) to provide for the continuation of programs authorized under the Economic Opportunity Act of 1964, and for other purposes.

The message announced that the House had passed a bill (H.R. 10835) to establish an Office of Consumer Affairs in the Executive Office of the President and a Consumer Protection Agency in order to secure within the Federal Government effective protection and representation of the interests of consumers, and for other purposes, in which it requested the concurrence of the Senate.

ENROLLED BILL SIGNED

The message also announced that the Speaker had affixed his signature to the enrolled bill (H.R. 6915) to amend the tobacco marketing quota provisions of the Agricultural Adjustment Act of 1938, as amended.

The enrolled bill was subsequently signed by the President pro tempore.

THE JOURNAL

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the reading of the Journal of the proceedings of Wednesday, October 13, 1971, be dispensed with.

The PRESIDENT pro tempore. Without objection, it is so ordered.

VACATING OF ORDER FOR SENATOR JAVITS TO SPEAK TODAY AND ORDER FOR SENATOR SCOTT TO BE RECOGNIZED INSTEAD

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the consent granted to the distinguished Senator from New York (Mr. JAVITS) to speak for 15 minutes today, at the conclusion of the recognition of the joint leadership, be vacated and that the distinguished minority leader, the Senator from Pennsylvania (Mr. SCOTT), be recognized instead for a period of not to exceed 15 minutes.

The PRESIDENT pro tempore. Without objection, it is so ordered.

COMMITTEE MEETINGS DURING SENATE SESSION

Mr. MANSFIELD. Mr. President, I ask unanimous consent that all committees may be authorized to meet during the session of the Senate today.

The PRESIDENT pro tempore. Without objection, it is so ordered.

EXECUTIVE SESSION

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the Senate go into executive session to consider nominations on the Executive Calendar, under New Reports.

There being no objection, the Senate proceeded to consideration of executive business.

The PRESIDENT pro tempore. The nominations on the Executive Calendar, under New Reports, will be stated.

COMMUNITY DEVELOPMENT CORPORATION

The second assistant legislative clerk read the nomination of Samuel C. Jackson, of Kansas, to be a member of the Board of Directors of the Community Development Corporation.

The PRESIDENT pro tempore. Without objection, the nomination is considered and confirmed.

NATIONAL CORPORATION FOR HOUSING PARTNERSHIPS

The second assistant legislative clerk read the nomination of Walter James Hodges, of Virginia, to be a member of the Board of Directors of the National Corporation for Housing Partnerships for the term expiring October 27, 1972.

The PRESIDENT pro tempore. Without objection, the nomination is considered and confirmed; and, without objection, the President will be immediately notified of the confirmation of these nominations.

LEGISLATIVE SESSION

Mr. MANSFIELD. Mr. President, I move that the Senate resume the consideration of legislative business.

The motion was agreed to, and the Senate resumed the consideration of legislative business.

PROGRAM FOR TODAY AND NEXT WEEK

Mr. MANSFIELD. Mr. President, for the information of the Senate, the unfinished business is Calendar No. 332, S. 215, dealing with suggested procedures applicable to constitutional conventions. It will be followed, not necessarily in this order, by S. 748, U.S. contributions to Fund for Special Operations of the Inter-American Development Bank; S. 2010, increased participation by the United States in the International Development Association; and S. 749, U.S. contributions to the special funds of the Asian Development Bank.

Furthermore, very likely, on Tuesday next, October 19, 1971, the conference report on H.R. 9844, the Military Construction Authorization Act of 1971, may well be called up.

Furthermore, under order of the Senate, a bill—S. 896—which, having been reported by the Committee on Commerce and which was referred to the Committee on the Judiciary, must be reported today. This is a major consumer item and relates to warranties and guaranties.

This proposal will come up early or by the middle of next week and there may well be amendments and votes thereon.

Furthermore, it is anticipated that approximately on Wednesday or Thursday next, the foreign aid authorization bill may well be reported from the Committee on Foreign Relations. It would thereafter be available for consideration.

ORDER FOR ADJOURNMENT TO 11 A.M. ON TUESDAY, OCTOBER 19, 1971

Mr. MANSFIELD. Mr. President, in view of the schedule which seems to be developing, and in an effort to expedite the business of the Senate so that we may get out at a reasonable time this year, I ask unanimous consent that instead of meeting at 12 o'clock noon on Tuesday next, the Senate meet at 11 o'clock in the morning on that day.

The PRESIDENT pro tempore. Without objection, it is so ordered.

ORDER OF BUSINESS

The PRESIDENT pro tempore. Under the previous order, the distinguished Senator from Pennsylvania (Mr. SCOTT) is now recognized for 15 minutes.

SENATE RESOLUTION 177—SUBMISSION OF A RESOLUTION RELATING TO THE SALE OF PHANTOM JETS AND SUPPORTING EQUIPMENT, AND ASSISTANCE TO ISRAEL

Mr. SCOTT. Mr. President, today, on behalf of myself and 77 colleagues in the Senate, I submit again a resolution urging the sale of phantom jets, and to provide supporting equipment and assistance by this country, to the state of Israel.

This resolution is similar to the one we submitted a year ago. But today we have additional cosponsors.

Mr. President, I am heartened by the announcement of Secretary of State Rogers to recognize this country's position in providing aid to the beleaguered Israelis. This is most encouraging as they face the latest Russian weaponry pledge to the Egyptians revealed yesterday.

The peace has been kept in the Middle East, because of a show of strength.

The Arab nations know this. Israel knows this. Russia and this country are deeply aware that pending successful peace negotiations, all parties will maintain strong defenses. There has been no shooting for 15 months, and that, in itself, is progress.

On my recent trip to Russia, I was privileged to have a meeting with Mr. Suslov, the Minister of Ideology—chief of the foreign affairs section—one of the best known and most influential of all Russian leaders, a distinguished gentleman who had, so far as I know, never before agreed to meet with an American.

I had a very interesting meeting with him. He agreed with my observation that other nations are scared of both our countries. He agreed that we both have obligations to the other countries of the world.

We know that negotiation is better than confrontation, and that is the reason for the journey to Moscow announced this week by President Nixon.

It is agreed that we must talk. That is what we will continue to do. That is what the President is doing. But, in the meantime, while Russia keeps the Arab na-

tions strong, the United States must balance the weight of defense for Israel.

This administration firmly believes that the best hope for peace is to keep Israel strong, that the best way to peace is through negotiation.

We have come to realize that there is a genuine convergence of interest between Israel and our Government—that a strong Israel helps to strengthen the free world, not only militarily, but in a demonstration of the meaning and vitality of the democratic way of life.

Any weakening of our commitment to Israel greatly enhances Soviet power and weakens friendly governments in the Middle East, Africa, and Europe.

Here is where American and Israeli interests really converge. We share a common commitment—the commitment to freedom, to liberty, and the welfare of humanity.

Mr. President, I ask unanimous consent to have printed in the RECORD a statement by the distinguished Senator from New York (Mr. JAVITS) on this subject.

There being no objection, the statement of Senator JAVITS was ordered to be printed in the RECORD, as follows:

THE VOICE OF THE SENATE ON MIDEAST ARMS BALANCE

Mr. JAVITS. Mr. President, today the Senate speaks with a well nigh united voice on one of the most crucial issues facing the world—the maintenance of the arms balance in the Mideast. I have been privileged to be closely associated with Senators Scott, Symington, Ribicoff and the other sponsors in the framing of the resolution introduced today by 77 Senators calling for the resumption of shipments of Phantom F- aircraft to Israel. It is rare to find the Senate of the United States so united as it is today on a crucial foreign policy issue. I trust that the leaders of the Soviet Union—and of the radical Arab states—will take due note of the solemnity and significance of what has happened here today.

President Nixon and Secretary Rogers are pursuing an active diplomatic policy of negotiation in the Mideast. That policy is certainly in the best traditions of U.S. diplomacy. However, it cannot succeed if there is any doubt in the minds of the Arab nations that Israel's deterrent defensive capabilities will be allowed to be weakened—or to be over-matched by massive Soviet arms shipments—such as those which continue under the new USSR-UAR agreement. Moreover, the U.S. diplomacy of negotiation cannot succeed if the Soviet leaders come to believe that the U.S. will retire from the field and leave an open path for Soviet adventurism in the Mideast. In such circumstances, the only diplomacy which could succeed would be the diplomacy of appeasement such as occurred at Munich in 1938.

Thus, a policy of maintaining Israel's deterrent strength is necessary and a logical corollary to the "negotiations track" now being pursued by Secretary Rogers. This is the clear view of over three quarters of the United States Senate and, in my judgment, it is the best view for the American people. And now is a most opportune time for the voicing of this deep conviction regarding the situation in the Mideast—for the United Nations General Assembly is now in session in New York and one of the prime questions under consideration and debate is the Mideast.

There is much questioning in various parts of the world these days regarding the sense of purpose, constancy and commitment by the people of the United States on international issues. The deep and devisive national debate over the Vietnam war has caused many observers to conclude—erroneously in my judgment—the American people and the American nation has lost its sense of purpose and its will to advance and defend world interests—in the cause of freedom and democracy.

The best answer to such a misreading and underestimation of American resolve lies in the resolution introduced today for us all by Senator Scott. When the American people understand the issues, as they do in the Mideast, and when they know they are supporting a self-reliant, valiant and capable democracy such as Israel, the American people can be very clear and determined in the course they wish to pursue.

Mr. President, this enormous expression of view by members of the United States Senate is an act of great significance which I am deeply convinced will help the cause of peace in the Mideast immeasurably. It can serve to demonstrate the danger and the futility of dreams of undoing Israel by military conquest. It can serve powerfully to underscore the necessity and inevitability of a negotiated settlement recognizing the rights and existence of Israel. It will hearten the people of Israel in their struggle to survive and give them a sense of faith in their national integrity which will help, not retard, Secretary Rogers negotiations. There is no way for nations of the Mideast to proceed other than through accommodation and normalized relations, if the dangers of a world conflagration are to be avoided. This resolution will help to make it clear that there can be no dreams of a quick or easy military thrust against Israel as a substitute for good faith negotiations.

Mr. SCOTT. Mr. President, I note that while we have this very large number of cosponsors, the original cosponsors are, in addition to myself and the Senator from New York (Mr. JAVITS), the senior Senator from Missouri (Mr. SYMINGTON), and the senior Senator from Connecticut (Mr. RIBICOFF).

At this time I am very glad to yield to the distinguished Senator from Connecticut (Mr. RIBICOFF).

The PRESIDING OFFICER. The Senator from Connecticut is recognized.

Mr. RIBICOFF. Mr. President, I thank the minority leader for yielding.

Mr. President, the resolution being submitted today comes at a crucial time in the evolution of American policies in the Middle East. It is being cosponsored by no less than 78 Members of this body in response to the withholding of needed aircraft from Israel in order to press her to agree to a reopening of the Suez Canal on Soviet and Egyptian terms. Unless this dangerous drift in our policies is halted both vital American strategic interests and the interest of peace in the Middle East will be sacrificed.

I do not question the sincere desire for peace motivating our policymakers. But many of us are puzzled over the manner in which they are seeking to work out an agreement between Israel and Egypt. There has also been too much confusion over the State Department's maneuvers the past several months, and it is time to dispel the illusions which have been created.

It seems perfectly clear by now that the Suez Canal will not be reopened on any terms other than those dictated by Egypt and the Soviet Union. The only real concessions made so far have been by Israel. No compromise will be forthcoming from Egypt as long as President Sadat believes all he must do is maintain his intransigence and let the United States continue to whittle away Israel's position. It is time that we look behind the State Department's optimism for a settlement and look at what its present policies are actually accomplishing.

Despite denials to the contrary, it is clear that the State Department is withholding the further shipment of Phantom jet aircraft to Israel in order to pressure her into making even more concessions for a canal reopening. It is equally apparent that the Egyptians are holding out for all of their own terms, yet the State Department continues to translate Sadat's equivalent of "nyet" into the word "yes."

Valid arguments have been made that the reopening of the Suez Canal would benefit the Soviet Union more than the United States. In an article which appeared in yesterday's New York Times written shortly before his death, Dean Acheson wrote about Russia's goals in the Mideast. Secretary Acheson was a statesman who looked beyond the everyday problems of diplomacy to the larger, long-run picture of relations between nations.

Acheson warned that the Soviet Union is pursuing two goals in the Middle East—maintaining a state of tension there and reopening the Suez Canal—giving the Soviet Union naval dominance in the Persian Gulf and Indian Ocean and control over the movement of oil. He stated that:

The Kremlin must regard with some surprise Secretary of State Rogers' eager advocacy of reopening the Canal as a preliminary to—something.

He asserted:

The Kremlin has always believed the saying of a medieval scholar "the height of stupidity and weakness is not to know an enemy from a friend."

Acheson concluded that:

Foggy Bottom was not able to make the distinction at the time of the Suez crisis of 1956 and has apparently not made progress in that direction since.

But even assuming that the issue of who benefits from a canal opening is one over which reasonable men might differ, there are other facts that cannot be disputed.

There is a continuing Soviet military build-up in Egypt of the most sophisticated weapons in the Soviet arsenal. There are some 20,000 Soviet military personnel there, including combat pilots. There are mass preparations underway for a canal crossing. There is continued Egyptian refusal to negotiate with the Israelis, or to settle for anything less than Israeli withdrawal from every inch of territory acquired in the aftermath of the 6-Day War—a war forced upon Israel by Egypt.

In the face of these facts, State Department spokesmen still maintain that there has been no shift in the arms balance. I wish that this were true. But it is not. Talk of Israel's qualitative superiority involves a trade off of Israeli lives for Soviet Mig's, missiles and tanks. Hardware may be expendable for the Soviet Union, but Israel is understandably reluctant to sacrifice young lives in overcoming Arab numerical superiority in men and weapons. We should expect more candor from the State Department,

more realistic assessments, more genuine evenhandedness, and more pressure on the Soviet Union—not on Israel, an ally of the West.

The Israelis view Secretary Rogers' recent speech at the United Nations as doing just what he previously said he would not do. They assert that the State Department had backed down from three positions previously endorsed. First, that Egyptian military forces would not be allowed to cross over once Israeli troops withdrew to permit the canal's opening. Second, that a Suez agreement would not be linked to any commitments to a broad or more comprehensive settlement. And, thirdly, that the United States would act as a middleman between Israel and Egypt and not spell out a position that would inhibit free bargaining.

I am afraid that many Americans have also been misled as to the current thrust of our policies. There is a pressing need for an unequivocal expression of American support for the maintenance of the arms balance in the Middle East and an American commitment to the spirit and letter of Security Council Resolution 242 of November 1967. That is why this resolution is being introduced today, by both Republican and Democrat Senators representing all regions of our country.

The language of this resolution is clear. There are only two operative paragraphs, but they contain the principles upon which lasting settlement in the Middle East can be achieved. These are the maintainance of Israel's military capability so that the Soviet Union and the Arab States do not think they can overwhelm her militarily. Second, and most immediately, that our government should supply Israel with Phantom aircraft and such equipment and assistance that is necessary to maintain her deterrent capabilities. Third, that our Government should oppose attempts at the United Nations to depart from the meaning and effect of Security Council Resolution 242, and that in any peace settlement the importance of secure and defensible borders be adhered to. Finally, the resolution states the obvious—that only through negotiations between the parties themselves can peace be achieved.

Mr. President, had our Government followed these principles since the six day war, I think we would be much closer to peace today than we are. But it is still not too late to reverse the trend of our present policies. I hope this resolution will put our policymakers on notice where more than three-quarters of the Senate stands on the subject of the Middle East, and I hope they act accordingly.

Mr. SCOTT. Mr. President, I yield now to the distinguished senior Senator from from Missouri (Mr. SYMINGTON).

Mr. SYMINGTON. Mr. President, I appreciate the courtesy of the distinguished minority leader.

Mr. President, first without reservation, that I support this resolution because I believe it to be in the best interest of the United States that the request be acceded to by the administration.

At the time the State of Israel was formed, I was Secretary of the Air Force under President Truman and know of the efforts of this Government in the creation of this State. Therefore, I believe we have some responsibility.

For literally years now, since the six day war in 1967, we have been told by the administration that they were maintaining a balance of power, one might say, in what they would or would not sell Israel in the way of military equipment. Their position in this matter has been hard for me to understand.

They stated they have been maintaining a military balance between Israel and the Arab countries despite the very large number of warplanes the latter have as against what Israel has; and justifies this on the grounds of high morale and better training of the Israeli forces.

Before the 6-Day War in June, 1967, there was a part of Israel 12 miles wide. Regardless of morale or training it would be difficult to see how a sudden attack with modern weapons could be resisted because of the relatively short distances involved.

For some time in the press there were stories that the new Soviet Mig–23, the Foxbat, is now in Egypt with Soviet pilots. This important development was recently confirmed by the Vice President of the United States. Now if the balance was a right balance before the introduction of the Foxbat, the most modern fighter plane in the world today, anyone would have the right to ask how the balance could be right today.

Much of this information has already been given by one of the Senate authorities on military matters, the distinguished Senator from Washington (Mr. JACKSON). I commend him for the fine effort he has made to get the truth in this matter out to the American people.

Mr. President, I have in my hand recent intelligence analysis. I cannot give the detailed figures because of security reasons, but it is a fact that the Israel Air Force is not only now outnumbered at least 5 to 1, but, as previously mentioned, is now confronted by the world's finest fighter, the Soviet Foxbat. The United Arab Republic is the only country in which this plane has been placed by the Soviet Union. All the rest of these new planes are within the borders of Soviet Russia itself.

Under those circumstances I was gratified to read in the paper this morning that Secretary of State Rogers will review the entire matter and would hope this Senate resolution would help him and the administration to reach a favorable decision on the matter the resolution recommends.

I respectfully commend my friend, the able minority leader, for bringing up this resolution before the Senate today.

Mr. SCOTT. Mr. President, I thank the distinguished Senator. I think the Department of State is well aware that the resolution has been in preparation for some time.

Mr. SCHWEIKER. Mr. President, I am pleased to join as a cosponsor of this highly important and timely resolution addressed to the critical Middle East situation. In my judgment this resolution points the way toward policy decisions that are definitely in the interest of attaining future peace in the Middle East and averting another war in the immediate future.

Mr. President, this resolution calls for two vital steps by the administration. First, the prompt approval of Israel's current request, pending since early this spring, for more F–4 Phantom aircraft in order to preserve the balance of military power in the Middle East. Second, the commitment by our Government to stand by the basic principles of Security Council Resolution 242 of November 22, 1967, reaffirming the importance of secure borders in a peace settlement negotiated by the parties themselves.

These two steps must become our clear and unequivocal position, if we are going to maintain the balance of power that should exist between Israel and its Arab neighbors, and if we are truly interested in a viable, long term state of peace. There can be no peace in the Middle East in the near future unless Israel stays strong enough to deter an attack from its hostile neighbors. There can be no peace in the Middle East in the long run unless the parties themselves have negotiated such a peace themselves and have provided secure borders as part of the agreement.

Mr. President, on June 4, 1971, upon returning from a visit to Israel, I wrote personally to the Secretary of State urging that he act promptly on Israel's request for additional Phantoms, At that time, the request was 2 months old. I renewed my call in an address August 22 in Cleveland before the national convention of Hadassah, the Women's Zionist Organization of America.

Now I feel the time has come, after the many individual appeals that I and many of my fellow Senators have made to our administration, to offer and pass a resolution such as this one. Each month that our Government delays in approving this request is a signal to the Soviet Union that it can proceed full steam ahead in arming the Egyptians and the Syrians, and in supplying not just the most sophisticated planes, missiles, and other equipment but Soviet pilots and other personnel, as well. By our hesitation we are telling the Soviets and the Arab governments hostile to Israel that we are not really that concerned with the massive Soviet buildup, that they can go further and further without brooking any direct opposition from us.

Our hesitation is not in the interests of Middle East peace. It only encourages the continuing Soviet military buildup that poses on outright threat to the security of Israel and to U.S. interests in the Middle East, as well. If we show that we can be firm, and let Israel have the arms it needs to maintain the balance of power with its neighbors, we will be making a very good, and not really costly, investment in future peace for the Middle East.

Mr. President, the second part of the resolution calls on our Government to reaffirm the importance of secure, defensible borders, as an integral part of the Middle East settlement and as negotiated by the parties themselves. After many years of hearing the phrase "secure borders," this year in Israel I finally saw with my own eyes what this expression means.

It means that Israel farm settlements

in Galilee have been safe since 1967 from murderous shelling by Syrian forces stationed on the Golan Heights looming above them. The Golan Heights today are a secure border.

It means that Israel ships and ships of other nations are now able to pass through the narrow Straits of Tiran and proceed unmolested toward Eilat, Israel's southern seaport, keeping up Israel's vital lifeline with the rest of the world. For Sharm-el-Sheikh, on the Sinai Peninsula facing the Straits of Tiran, is now a secure border, too.

I returned from Israel more convinced than ever of the need for the United States and Israel to work together in the cause of peace and progress in the Middle East. If we are to do this, then the two actions outlined in the resolution, providing Israel with both the military and diplomatic support it needs, are essential and are, in fact, the bare minimum.

I hope that this resolution can be favorably reported from the Committee on Foreign Relations and passed at the earliest possible time.

Mr. SCOTT. Mr. President, I ask unanimous consent that the resolution, together with a list of cosponsors be printed in the RECORD.

The PRESIDENT pro tempore. The resolution will be received and accordingly referred; and, without objection, the resolution and list of cosponsors will be printed in the RECORD.

The text of the resolution and list of Senate sponsors are as follows:

SENATE RESOLUTION 177

Calling for the shipment of Phantom F–4 aircraft to Israel in order to maintain the arms balance in the Middle East.

Whereas, the Soviet Union is continuing to supply additional sophisticated weapons including advanced jet aircraft, and has deployed combat pilots, and other military personnel in Egypt, and other Arab States;

Whereas, these actions have seriously affected the military balance in the Middle East and increased the danger of war; and

Whereas, the aforementioned developments have encouraged certain Arab states to resist peace negotiations and to threaten the resumption of war;

Whereas, this constitutes a grave threat to peace in the Middle East, prejudicial to the vital interests of the United States;

Whereas, the policy of the United States as expressed by the President and the Congress of the U.S. is to maintain the arms balance in this region;

Resolved by the Senate, that

(1) The United States without further delay should take affirmative action on Israel's pending request for F–4 Phantom aircraft, and provide such supporting equipment and assistance as are essential to maintain Israel's deterrent capability;

(2) The United States Government should oppose any attempts at the United Nations to alter the meaning and effect of Security Council Resolution 242 of November 22, 1967, and should reaffirm the importance of secure and defensible borders as a vital element in a peace settlement to be negotiated by the parties themselves.

James B. Allen, Gordon Allott, Howard H. Baker, Jr., Birch Bayh, J. Glenn Beall, Jr., Lloyd Bentsen, Alan Bible, J. Caleb Boggs, Bill Brock, and Edward W. Brooke.

James L. Buckley, Quentin N. Burdick, Harry F. Byrd, Jr., Robert C. Byrd, Howard W. Cannon, Clifford P. Case, Lawton Chiles, Frank Church, Marlow W. Cook, and Norris Cotton.

Alan Cranston, Robert Dole, Peter H. Dominick, Thomas F. Eagleton, Hiram L. Fong, David H. Gambrell, Barry M. Goldwater, Mike Gravel, Edward J. Gurney, and Clifford P. Hansen.

Fred R. Harris, Philip A. Hart, Vance Hartke, Ernest Hollings, Roman L. Hruska, Hubert H. Humphrey, Daniel K. Inouye, Henry M. Jackson, and Jacob K. Javits.

B. Everett Jordan, Edward M. Kennedy, Warren G. Magnuson, Charles McC. Mathias, Jr., Gale W. McGee, George McGovern, Thomas J. McIntyre, Jack Miller, Walter F. Mondale, and Joseph M. Montoya.

Frank E. Moss, Edwund S. Muskie, Gaylord Nelson, Bob Packwood, John O. Pastore, James B. Pearson, Claiborne Pell, Charles H. Percy, William Proxmire, and Jennings Randolph.

Abraham Ribicoff, William V. Roth, Jr., William B. Saxbe, Richard S. Schweiker, Hugh Scott, John Sparkman, William B. Spong, Robert Stafford, and Ted Stevens.

Adlai E. Stevenson III, Stuart Symington, Robert Taft, Jr., Herman E. Talmadge, Strom Thurmond, John G. Tower, John V. Tunney, Lowell P. Weicker, Jr., and Harrison A. Williams, Jr.

ORDER OF BUSINESS

Mr. SCOTT. Mr. President, I yield the remainder of my time to the distinguished Senator from Connecticut (Mr. RIBICOFF).

The PRESIDENT pro tempore. The Senator from Connecticut is recognized for 3 minutes.

VACCINE SAFETY

Mr. RIBICOFF. Mr. President, I want to talk today about life and health in America. I want to raise some questions about what this Government is doing to help people stay healthy and to live longer. And I want to suggest some areas where perhaps this Government could be doing more—should be doing more—to keep many Americans from getting sick so often and from dying before their time.

Providing good doctors and hospitals to treat people who are sick is important and necessary. But there are things this Government can do and is not doing to keep people from getting sick in the first place. Nothing is more likely to build good health or to destroy it, to cause disease or to cure it, to help us live longer or to make us die sooner than the foods, drugs, and medicines we eat, drink, and swallow, and inject with needles into our bodies.

The safety of our foods and drugs and the failure of our Federal agencies charged with testing and regulating those foods and drugs to insure that safety, have become a major problem in American health. Many agencies are involved; their very number and the way the job is divided among them are primary sources of the problem.

The Food and Drug Administration, other agencies in the Department of Health, Education, and Welfare, the Department of Agriculture, the Federal Trade Commission, the Environmental Protection Agency, the Department of Justice—more than 60 agencies in all—have been given responsibilities for protecting the public against dangerous foods and drugs.

These agencies perform a function of the highest importance. But the continued proliferation of agencies in the field of food and drugs has inevitably created inefficiencies, questions of jurisdiction, and needless duplications.

From a very early time, people agreed that the Government had to do something to assure the safety of foods and medicines. It was simply a matter of life and death. In 1902, Congress authorized the Secretary of the Treasury to regulate the sale of viruses, serums, toxins, and analogous products applicable to the cure of disease in man. Today that act and its amendments are administered by the Division of Biologics Standards in the Department of Health, Education, and Welfare.

In 1906, Congress established the Food and Drug Administration in the Department of Agriculture to protect the American people from dangerous impurities in foods and drugs. As thousands of new products and new methods of producing, packaging and promoting these products were developed, Congress saw that it had to expand the responsibilities of the agency so that it could accomplish its mission. The Food, Drug, and Cosmetic Act has been amended many times, and major revisions in the law were made in 1938, 1951, 1964, and 1968. Today the Food and Drug Administration operates in the Department of Health, Education, and Welfare and has the most comprehensive mandate of any agency in the Government to protect the American people from dangerous foods, drugs, and cosmetics.

The increase in the kind and number of consumable products and the problems those products create has led not only to an expansion of the responsibilities of the FDA, but also to a proliferation of Federal agencies with varying responsibilities to regulate the way products are advertised and used and sold. Some of these responsibilities are overlapping; in other places there are gaps in responsibility that need to be filled.

Consider vaccines, for example, our primary means for preventing epidemics. The Food and Drug Administration has the responsibility for testing drugs to see that they are effective. Vaccines are drugs, yet they are tested not by the Food and Drug Administration, but by the Division of Biologics Standards—DBS—another part of the Department of Health, Education, and Welfare. However, the Division of Biologics Standards maintains that its statute gives it no responsibility to test vaccines to see that they work. They are tested only by the people whose business it is to sell them. This confusion is increased by the fact that vaccines for animals we use for food are tested neither by the FDA nor the DBS, but by the Department of Agriculture.

To cloud jurisdictional lines further, animals drugs that are not vaccines are tested and regulated not by the Department of Agriculture, but by the FDA.

This pattern is repeated in other areas as well, The FDA is responsible for testing and regulating food for safety—unless the food is meat or poultry or eggs. Those foods are inspected and regulated by the Department of Agriculture. But, as we just noted, drugs used on the animals that become our meat are regu-

lated not by the Department of Agriculture, but by the FDA.

Some of these drugs used in animals may be dangerous to people if traces of them are found in the meat of the slaughtered animals. It is not the FDA, however, but the Department of Agriculture that actually inspects the meat of the animals to determine whether the meat is safe. And only a very small percentage of the animals are actually tested to see if dangerous quantities of drugs are present. In the most comprehensive of all its tests for dangerous residues in 1970, the Department of Agriculture tested a sample of only one out of every 5,000 cattle actually slaughtered and used for meat in this country.

With so many agencies administering so many different and sometimes confusing and conflicting statutes, it has become hard to tell who has authority and responsibility to do a job that everyone agrees needs to be done. And so some serious problems are not met and continue to grow and to threaten the health of Americans until a tragedy happens and forces us into action. In other instances, where authority and responsibility are clear, some agencies have simply failed to do their jobs.

Through the Subcommittee on Executive Reorganization and Government Research, I have explored a number of areas in which important Federal regulation of food and chemical food additives has been shown to be inadequate.

We looked at the Department of Agriculture in 1969. The Department had issued a regulation requiring that hot dogs contain a maximum of 30 percent fat. Hot dogs are a staple of the American diet. Consumption has been increasing—and so has the fat content. This means that the American people are cheated out of good nutrition by the substitution of fat for meat.

I set out to learn if the Agriculture Department regulation was being properly enforced. To my surprise, I found that it was not. Later the Department indefinitely postponed enforcement of its own regulation. I found this a shocking situation and urged the Department to comply with its own rules. After a delay of many months, the Department of Agriculture informed me that all meat producers are now producing hot dogs within the standards set by the Department of Agriculture.

Later that year, we took another look at a different area of the Agriculture Department's responsibilities. A GAO report issued on September 10, 1969, indicated that inspection of poultry and poultry products by the Department of Agriculture failed to protect the public from products that were unfit for human consumption. Therefore, I asked the GAO to check on the enforcement of the Wholesome Meat Act.

GAO submitted a report to me on June 24, 1970, revealing that the Agriculture Department inspectors had overlooked numerous unsanitary practices in meat plants under the Department's jurisdiction. Just last week, a Federal grand jury in Boston returned indictments against 40 Government meat inspectors and three meat processing companies. The inspectors are accused of taking bribes to influence their reports. This number is more than half the total number of Agriculture Department inspectors in the Boston area, and the instances charged date back to 1962. One inspector was charged with taking up to $70,000 in bribes.

In April 1971, my subcommittee looked at several agencies responsible for assuring the purity and safety of food products. Our hearings revealed a number of alarming facts. We found, for example, that the Swedish Government will not even allow U.S. beef to enter Sweden unless the actual carcasses are certified as additive-free by the U.S. Department of Agriculture. Yet the Department is willing to allow the same meat that Sweden bans to be sold to the American people.

We also learned in those hearings that there are over 600 food additives listed by the FDA as "generally recognized as safe" that have never been adequately tested for safety. We discovered that the FDA allows chemicals to be added to food without requiring any tests to show that the chemicals will not cause birth defects or genetic damage.

Witnesses testified further that a drug commonly used on cattle, DES, can produce cancer and Department of Agriculture testing for its presence in meat was inadequate. The Department has recently admitted that residues of this drug have been found in a substantial number of carcasses.

We learned a great deal more during the hearings, and we asked the agencies responsible for food safety to explain what they are doing about these problems. The agencies have replied to our inquiries on this subject; their replies, together with the comments of a number of experts in the field, will soon be released by the subcommittee.

These findings raise serious questions about the adequacy of Government regulation of foods and food additives. Perhaps even more serious, however, are questions raised by new information in the area of drugs and vaccines recently submitted to the subcommittee.

The goal of a vaccination program is the total eradication of the disease. At least one vaccine—smallpox—appears to have accomplished its mission. There has not been a single case of smallpox in the United States since 1949. The vaccine itself, however, causes a small number of deaths. At some point, the risks of vaccination begin to outweigh the risks of an epidemic. This is a difficult scientific judgment to make, and the Communicable Disease Center will soon consider this question with respect to the smallpox vaccine. Recent newspaper reports suggest that universal vaccination may no longer be required.

But smallpox, unfortunately, is the exception rather than the rule. The incidence of other diseases for which vaccines are available, such as diphtheria, polio and measles, has been vastly reduced; but these diseases have not been wiped out completely. At the same time, surveys show that fewer and fewer people are actually taking polio and measles vaccines, perhaps because they wrongly believe these diseases no longer threaten them. It is especially discouraging that this administration has chosen to cut back its program of measle vaccination. When people fail to take the vaccine before the disease is fully eradicated, we risk a new outbreak of the disease.

At the same time, however, questions have been raised about the way in which the Federal vaccine testing program is being administered. Documents supplied to the subcommittee by Dr. J. Anthony Morris of the Division of Biologics Standards and Mr. James Turner cast considerable doubt on the wisdom of a number of the division's decisions and upon its general method of operation.

The Division of Biologics Standards must license the distribution of all vaccines sold in interstate commerce in the United States. There were 19 such vaccines in use in 1970, and approximately 150 million doses of these vaccines were distributed in the United States last year.

The Division itself proclaims the importance of its work. In the Division's own words:

> The DBS is responsible for establishing and maintaining standards of quality and safety of all biological products that come within the jurisdiction of the Public Health Service. These products include all vaccines, antitoxins, therapeutic serums, allergenic products, and human blood for transfusion, as well as products prepared from human blood. Because many of these products are derived from living organisms, such as bacteria and viruses, and all by their nature are either potentially dangerous or ineffective if improperly prepared and tested, close surveillance of production is essential.

Incredibly, however, in spite of this statement, DBS apparently believes that it has no legal authority to test vaccines for effectiveness in actually preventing diseases. As I pointed out earlier, this means that no Federal agency tests vaccines to see if they work. If this legal interpretation is correct, Congress should act to give the Division the duty to do so; if the interpretation is incorrect, the Division should begin to fulfill its responsibilities.

Dr. Morris' allegations raise a host of other troublesome questions about the way DBS operates. Some of those questions involve the following disturbing incidents:

In 1954 and 1955, one of the Division's most noted scientists, Dr. Bernice Eddy, discovered that several lots of polio vaccine contained live virus capable of causing the disease itself. In spite of Dr. Eddy's finding, which was known to the DBS leadership, this vaccine was released in the spring of 1955 and over 150 individuals who were associated with its use contracted paralytic polio. Just a few months before this incident, the Division had given Dr. Eddy a special "superior accomplishment award" in recognition of her outstanding achievements. In 1957, she and a coworker discovered the polyma virus. In recognition of her outstanding work, Dr. Eddy was featured on the cover of Cancer Research magazine in March 1971.

In the late fifties, DBS developed a so-called adenovirus vaccine, a vaccine essentially for the treatment of the common cold. In the late fifties and early sixties, this vaccine was being administered to all Army personnel. In 1960, Dr. Eddy discovered that material then used in the manufacture of adeno-

virus vaccines was capable of causing cancer in hamsters.

DBS responded to her discovery by denying her permission to attend certain professional meetings and to publish other papers. She was deprived of most of her testing animals and most of her testing facilities. Finally, on March 8, 1961, she was relieved of her job and reassigned.

Subsequent research by scientists outside DBS confirmed Dr. Eddy's findings. In the meantime, vaccines containing the substance continued to be used on the American people. Finally, DBS decided that Dr. Eddy had been right after all.

Still, it allowed adenovirus vaccine containing this material to be released as late as September 16, 1963, and it allowed a combined adenovirus influenza vaccine containing the same material to be released as late as August 10, 1964.

Other disturbing events allegedly have occurred including:

Reliance by DBS on dubious techniques for testing the potency of influenza vaccine.

The Division's failure in 1966 and 1967 to bar the release to the public of three lots of influenza vaccine for failure by the manufacturer to show that the lots were free of trace metal contamination.

Falsification of labeling and tampering with test results for influenza vaccine.

Active attempts by DBS to discourage scientific research which might tend to cast doubt upon previously taken agency positions.

Failure of DBS personnel to be aware of and enforce the Division's own regulations.

These allegations indicate that something is seriously wrong in DBS. The causes of the problem may lie in the Division's dual role as both developer and regulator of vaccines. This helps to create an overly close relationship with vaccine manufacturers that inhibits the establishment of rigorous testing criteria. Too often, the DBS has simply trusted vaccine manufacturers to evaluate the risks of vaccine use. Before acting to protect the public, DBS has required vast amounts of evidence to prove a vaccine harmful rather than requiring positive evidence at an early stage that a vaccine is both beneficial and safe.

I am today releasing to the public a memorandum by Dr. Morris and Mr. Turner detailing these and other allegations. I have already asked the GAO to undertake a report to the Subcommittee on Executive Reorganization and Government Research on the regulatory responsibilities of DBS, particularly involving vaccines for influenza, adenovirus, combined influenza-adenovirus, and pertussis.

I am also writing to the Secretary of Health, Education, and Welfare today urging that he fully investigate the charges raised and requesting that the subcommittee be given a full report as soon as possible.

In addition to the investigation of DBS, at my request the GAO has investigated a related matter: the role of the Food and Drug Administration and the Public Health Service in the investigational use of the tuberculosis control drug, isoniazid. Members of congressional staffs and others working on Capitol Hill were given this drug in the winter of 1970. Shortly thereafter many of those people developed hepatitis. Two of those taking the Public Health Service's drug actually died of hepatitis.

The subcommittee staff, together with the GAO, is analyzing the role of the Public Health Service and the FDA in this tragedy. Their report will be available in the near future.

In addition to this inquiry, I have asked the GAO to undertake an evaluation of the Department of Agriculture's inspection and regulation of poultry plants.

The GAO is also preparing for publication a comprehensive report on conditions in all plants producing, processing, and packaging the food we eat.

The specific incidents I have cited today regarding the ineffectiveness of the Division of Biologics Standards are merely examples which have happened to come to light through the work of Mr. Turner. They represent only a small fraction of the work done by Federal agencies in regulating the content of food and drugs. I do not know whether these instances are standard operating procedure or simply regrettable but isolated lapses of judgment. We need to find out.

If further investigation shows that such instances as these are commonplace, we owe it to the American people to demand a better job. Perhaps responsibility is too divided among several agencies. Perhaps some should be consolidated. Perhaps some statutes are ambiguous and should be amended to give Federal agencies a clearer mandate to protect the vital interests of the American people. Perhaps the agencies themselves will have to be restructured.

Whatever it takes to assure that food is safe and that medicine is both safe and effective is worth the price. What is at stake is, for many Americans, a matter of life and death.

Mr. President, I ask unanimous consent that the full text of the memorandum prepared by Dr. Morris and Mr. Turner be printed in the RECORD.

There being no objection, the memorandum was ordered to be printed in the RECORD, as follows:

MEMORANDUM

(Following is a memorandum prepared by J. Anthony Morris, Ph.D. of the Division of Biologics Standards, Department of Health, Education and Welfare and his attorney, Mr. James S. Turner, regarding certain activities of the DBS:)

SEPTEMBER 27, 1971.

Senator ABRAHAM RIBICOFF,
Senate Office Building,
Washington, D.C.

DEAR SENATOR RIBICOFF: Please find enclosed a memorandum delivered today to Dr. Robert Q. Marston, Director of the National Institutes of Health, concerning the scientific shortcomings of the NIH's Division of Biologics Standards.

We believe that this memorandum raises serious questions of the utmost importance to the public health of the nation. Therefore we urge you to take the time to delve deeply into each issue raised—and others suggested—to find what problems may exist or to put to rest doubts that these unexplained incidents have allowed to linger.

Sincerely yours,

J. A. MORRIS, Ph.D.
Research Microbiologist, DBS.

B. G. YOUNG, Ph.D.
Assoc. Prof., Univ. of Maryland, Chairman, Dept. of Microbiology.

J. E. WHITMAN, JR., Ph.D.
Senior Research Virologist, Lederle Laboratories.

J. S. TURNER,
Attorney, Employee Representative for Dr. J. A. Morris, DBS.

SEPTEMBER 27, 1971.

Dr. ROBERT Q. MARSTON,
Director,
National Institutes of Health,
Bethesda, Md.

DEAR DR. MARSTON: Enclosed please find the memorandum we agreed to prepare at your invitation during our meeting on July 13, 1971. This memorandum concerns. "The Misuse of Scientific Resources at the Division of Biologics Standards". A second memorandum will be submitted at a later time and will be concerned with important legal considerations in the matter of J. A. Morris and their relation to vaccine regulation. Both have implications of extreme importance for American public health.

We hope that these memoranda will aid you in reaching a formal conclusion on the Appeal in the matter of J. A. Morris and in determining what kinds of actions might be necessary to insure that the DBS effectively protects and advances the public health through proper regulation of vaccines.

Sincerely yours,

J. A. MORRIS.
JAMES S. TURNER.

MISAPPLICATION OF SCIENTIFIC RESOURCES AT THE DIVISION OF BIOLOGICS STANDARDS, NATIONAL INSTITUTES OF HEALTH

I. The front page of the New York Times for Sunday, September 19, 1971 reads "Infectious Diseases Rise as Use of Vaccines Lags." The article reports a drop in polio immunization from 79% of youngsters below the age of four in 1966 to 65.9% last year. Measles immunity shows a comparable drop. Resistance factors, according to the article, also inhibit the use of combined diphtheria, whooping cough and tetanus vaccines.

In the face of this decline in vaccine use it is essential for the advancement of public health that the Division of Biologics Standards of the National Institutes of Health exhibit the highest regard for scientific integrity, and regulatory effectiveness. Unfortunately the attitude displayed by officials of the Division can only lead to an undermining of confidence in vaccine therapy.

In the recent hearing concerning the grievances of Dr. J. Anthony Morris, Dr. Alexi Shelokov said under oath, "For many years I have not taken influenza vaccine myself or given it to my family; I have not been impressed with its potency." (1) For six years between 1963 and 1969 Dr. Shelokov was the DBS officer responsible for insuring the potency of the influenza vaccine. His successor in that job, Dr. Nicola Tauraso, under oath during the same hearing said "they (influenza vaccine manufacturers) would sell water if they could get away with it." (2) Dr. James Whitman, a researcher for a company which worked closely with the DBS to develop the first rubella vaccine, refused that vaccine for his two children in a mass immunization program because he felt another rubella vaccine, developed by a company other than his company, was likely to produce fewer side effects. (3) Other researchers both inside and outside of government

have suggested that the best vaccine available is not necessarily in use and that sufficient concern has not been given to side effects associated with the use of the first rubella vaccine licensed.

This opinion and concern about the safety and effecti eness of vaccines cannot be overlooked as a factor in impeding the development of public confidence in vaccine therapy. As the Federal Government's primary regulator of vaccines, the Division of Biologics Standards should be in the forefront of efforts to present the public with the best and most effective and safest vaccines possible. Unfortunately the Division is not in the forefront. Rather it lags so far behind as to be jeopardizing the very concept of vaccine therapy by its scientific mismanagement.

The following events suggest a major breakdown in the scientific integrity of the DBS and raise important questions worthy of immediate and detailed investigation:

(A) The failure in 1954 and 1955 of DBS leadership to act on the discovery, made in DBS laboratories, that in activated polio vaccine contained virus capable of causing disease in recipients of this contaminated vaccine.

(B) The failure of the DBS leadership to act effectively and rapidly on the 1960 discovery, again made in DBS laboratories, that the material used in the manufacture of polio-virus and adenovirus vaccines was capable of causing cancer in hamsters.

(C) The reliance of the DBS even today on the chicken cell agglutination (CCA) test to measure the potency of influenza vaccine in spite of the fact that experiments in DBS laboratories conducted as early as 1961 show the test to yield such widely divergent results that it can only be considered inaccurate, in fact the DBS has relied on the Pharmaceutical Manufacturers Association to set the standards (inaccurately) for influenza virus vaccine potency.

(D) The release by the DBS in 1966 and 1967 of at least three lots of influenza vaccine marked by the responsible DBS scientist "HOLD" because proper evidence that the lots were free of trace metal contamination had not been presented by the manufacturers.

(E) The failure of the DBS to act upon the evidence that influenza virus vaccine is of little value in protecting man against influenza in spite of legislative authority authorizing the agency to require all vaccine manufacturers to show that their vaccines are effective.

(F) The failure of the DBS to undertake detailed research to determine the nature and importance of indigenous virus and virus-like particles found, by DBS investigators in 1969, to contaminate the duck embyro substrate used in the manufacture of rubella vaccine.

(G) The DBS failed and then actively discouraged pursuit of research on so-called "slow viruses" potentially capable of contaminating all materials from which all virus vaccines are manufactured.

(H) In all of the above instances active steps were taken by the leadership of the Division of Biologics Standards to discourage important scientific work. In some cases the writings (reporting work already confirmed within the NIH organization) of scientists were not approved for publication. In some cases scientists were deprived, over vigorous objection, of their laboratory space, experimental animals, and other material resources because their scientific findings adversely affected the vaccine market. In some cases scientists were told that they could not collaborate with other scientists on work that had important implications to vaccine safety.

(I) As a result, in whole or in part, of the above incidents established scientists of high reputation have been forced to chose between work at DBS under conditions severely limiting their scientific effectiveness or to leave the DBS to find useful employment elsewhere in order to carry out their duty to the public.

(J) A number of additional questions are raised by the following incidents:

(1) It is alleged that one manufacturer received a list of directions and questions about the clinical testing of chicken pox vaccine (Varicella Virus Vaccine, Live) to be followed or answered "prior to its use in clinical trials" which had already begun.

(2) The primary responsibility for determining safety of vaccines rests with vaccine manufacturers. One industry scientist suggests that the mumps vaccine was certified as safe by its manufacturer over the scientific doubts of some of its own researchers. The measles vaccine prepared by another manufacturer is checked for contamination by avian leucoses virus that causes cancer in chickens by a procedure which is incapable of detecting more than a few of many known groups of such contaminating agents. In fact DBS handling of doubts about this test—known as the RIF test—are in particular need of investigation.

(3) The dual role of the DBS as a regulator and developer of vaccines carries with it a built in conflict of interest. One former DBS scientist has written that he will work to see to it that "DBS never again finds itself in the role of developing a biological, then sitting in judgment regarding its safety, efficacy, purity, potency, etc. I believe that I can document a good case for conflict within the Division in the case of the rubella vaccine development and licensing."

II. The particulars of each of these instances suggest a pattern of administrative insensitivity which allowed the American public to assume unnecessary health risks. First, highly qualified scientists using sound scientific experimentation would find indications that a vaccine or vaccine regulation procedure was either ineffective or unsafe. Then, administrative supervisors of these scientists would require them to direct their work into other fields or block them from reporting their results. Finally, as a result of the administrative action, scientific controversies which could have been resolved (to the advantage of public health) were allowed to continue and indeed to continue to the present day. The details of these situations are as follows:

A. EARLY (1955) POLIOVIRUS VACCINE

On October 26, 1953, Dr. W. H. Sebrell, Director, National Institutes of Health, awarded Dr. Bernice Eddy of the Division of Biologics Standards' predecessor agency "a superior accomplishment award." This award was in "in recognition of your outstanding achievements in the recent developments of standardized neutralization tests of poliomyelitis immune globulin. The award carries with it a one step within grade salary increase." (4)

From that time to the present, Dr. Eddy has been held in the highest esteem of her colleagues in the scientific community. By 1957 Dr. Eddy and her co-worker Dr. Sarah E. Stewart had discovered the polyoma virus named the SE (for Drs. Stewart and Eddy) virus. In recognition of her continued outstanding work, Dr. Eddy was featured on the cover of Cancer Research in March, 1971 (vol. 31, No. 3). The discovery of polyoma virus which causes cancer in hamsters, rabbits, rats, guinea pigs, and other rodents and the development of neutralization tests of poliovirus immune globulin were accomplished while Dr. Eddy served as control officer for respiratory virus and poliovirus vaccines for the federal government.

In 1954 while exercising her duties as control officer for poliovirus vaccine Dr. Eddy discovered that three lots of poliovirus vaccine were contaminated with live poliovirus. The inactivation technique employed in the manufacture of poliovirus vaccine failed to kill completely all of the live poliovirus contaminants. Dr. Eddy injected the vaccine into several monkeys to determine its effect. The monkeys contracted paralytic polio. Dr. Eddy had the monkeys photographed and reported her findings to her superiors. However, subsequent to this time and in spite of her information on its contamination with live poliovirus, the vaccine made by Cutter Laboratories was released for use to the public. (5) Dr. Eddy has never seen the pictures taken of the monkeys but they are supposed to be in NIH files. In 1955 she was relieved of her duties as polio vaccine control officer. The Cutter vaccine was released in the spring of 1955 and over 150 individuals who were associated with its use contracted paralytic polio. (6) The legal entanglement resulting from this situation continues to the present. If Dr. Eddy's information had been heeded when it was discovered, it is possible that a number of deaths and disabilities as well as a protracted 15-year controversy could have all been avoided.

B. CANCER CAUSING PROPERTIES OF POLIOVIRUS AND ADENOVIRUS MONKEY KIDNEY SUBSTRATES EMPLOYED IN VACCINE MANUFACTURE

As part of her routine control work and as a natural outgrowth of her research leading to the discovery of the polyoma virus, Dr. Eddy turned her attention to the spontaneous degeneration of Rhesus monkey kidney cells used in the preparation of poliovirus and adenovirus vaccines. She found in 1959 that the injection of Rhesus monkey kidney cells into baby hamsters led to the formation of solid tumors.

In July and August of 1960 Dr. Eddy attempted to transmit her information to her superior, Dr. Joseph Smadel. He interpreted her report as making "two entirely unwarranted statements. These two were: 1. You believed that the lumps might have something to do with the vacuolating agent and 2. that they might have something to do with cancer in man." (7)

Dr. Eddy claims that she did make the first point which was the essence of her discovery. She also claims that she did not make the second point. However, whatever she did say, there is evidence beginning to emerge that there might indeed be some relationship between her discovery and cancer in man. (8) The vacuolating agent is an inducer of cancer in hamsters and other rodents. (9) Both discoveries contained profound implications for future control work on poliovirus and adenovirus vaccines.

In view of the implications for future vaccine use of Dr. Eddy's discovery her treatment following it can only be called peculiar. She was reprimanded for having mentioned the discovery publicly at a meeting of the Cancer Society and told "In view of the apparent lack of critical scientific judgment and common sense on your part in this matter, I give you the following instructions. From now on, whenever you propose to speak before a scientific group outside of the LVR (Laboratory of Virology and Rickettsiology) you will submit a written manuscript for scientific review by me" (7).

Dr. Eddy's discovery was not published in the scientific literature for another two years. (11) In the mean time Dr. Maurice Hilleman of Merck Sharp and Dohme reported the isolation of the vacuolating agent and called it SV40. (9) In August of 1960, Dr. Eddy was engaged in an internal DBS controversy about reporting her discovery that a vacuolating agent in monkey kidney cells might be casually related to experimentally induced cancer in hamsters. At nearly the same time, Dr. Hilleman was discovering an agent in monkey kidney cells which he called SV40 without knowing that it possesed oncogenic potential. Delay of Dr. Eddy's publication dealing with the oncogenic property of Rhesus monkey kidney cells might well have delayed the establishment of its etiologic role in experimentally induced cancer in hamsters.

As Dr. Eddy argued for publication of her work she also fought to retain her laboratory. In August of 1960 after being informed that she would lose much of her animal space, she wrote, "One-eighth of each of two animal rooms and one-third of another is inadequate to do satisfactory work in influenza viruses

or any other respiratory virus and in addition it means that work I am doing on human tumors be curtailed . . . I am unable to follow the reasoning that a million dollars or a large institution is necessary to isolate and study human tumor viruses." (13) In spite of her efforts, Dr. Eddy lost her animal facilities. (14)

At the same time, she was denied permission to attend certain professional meetings and to publish other papers. (15) The argument made by the Division was that control work and basic research were incompatible. However, Dr. Eddy continuously denied this argument. She wrote on August 10, 1960 "The polyoma work was done along with a great deal of control work and also research work on both influenza viruses and adenoviruses and the human tumor work can be continued in the same way in my present space." (13) Dr. Eddy also lost this argument.

On February 16, 1971 Dr. Roderick Murray informed Dr. Eddy that there appears to be a conflict between your various responsibilities and interests (i.e. control work and research (17). Dr. Murray informed Dr. Eddy that as of July 1, 1961 she would be asked to spend full time on research, given two assistants (a decrease from her then current staff), relieved of the "irksome responsibility" (Dr. Murray's words) "connected with the control of products derived from respiratory viruses," and offered her three months off for a research trip around the United States. (17)

Two days later Dr. Eddy replied. In a detailed memorandum she refuted every assumption and every statement made by Dr. Murray. Concerning the alleged conflict she wrote, "There is no conflict whatever between my responsibilities and interests . . . The work on the tumor inducing agent from monkey kidney cell cultures is not unrelated to biologics control since both adenoviruses and polioviruses are propagated in monkey kidney cell cultures in vaccine production . . . I am intensely interested in biological control work or, I can assure you, I would not have stayed here as long as I have (since 1937)." (18)

When Dr. Eddy was informed in more detail ten days later of her intended new assignment (19) she again responded immediately. "I appreciate the additional information on the proposed Section of Experimental Virology. However, it does not change my desire to remain in the position I now hold . . . I am intensely interested in the control work on the respiratory viruses . . ." (20) On March 8 Dr. Eddy received a memorandum in which Dr. Smadel "informs me that I shall be forced to vacate my present position." (21)

On May 16, 1961, Dr. Eddy sent a memorandum to the Chief of the Laboratory of Control Activities which went to the heart of the matter. "Since the vacuolating virus is known to be exceedingly stable and its effect on the human population is unknown at present, should a requirement be added to the regulations to the effect that the (adenovirus) vaccines should be free of the vacuolating virus?" (22) Dr. Eddy did not mention such a requirement for polio vaccines because she had been removed from its control. However, the same question could have been asked about that vaccine.

A curious picture is presented by the events that happened to Dr. Eddy. As long as she engaged in basic research of only peripheral relevance to her control activities she was allowed to proceed without inhibition. As her research began to identify factors which might require changes in regulatory control of vaccines her work was hampered. Yet the justification for the action against her work was that it had little relevance to control activities.

Dr. Lawrence Kilham, one of Dr. Eddy's coworkers, wrote to an official in the Surgeon General's office after seeking his help in the matter. What he said serves as an important summary of the situation in which this world renowned researcher found herself. He wrote, "Many scientists at the N.I.H. are extremely dissatisfied with the conditions which prevail. A true intellectual atmosphere is practically nonexistent. Dr. Eddy's case to many of us represents a somewhat Prussian-like attempt to hinder an outstanding scientist, who is making a contribution in an important field of biologics control . . . I feel sure that the battle for fair play is going to continue. Outside support is not lacking, especially when such an explosive issue as the presence of a cancer virus in the poliovirus vaccine is the matter demanding full investigation." (23)

On July 1, 1961, Dr. Eddy assumed her new duties. Her efforts seeking the intervention of the Surgeon General of the United States failed. (24) But the real problems raised by her research did not end there.

It was subsequently learned that SV40 multiplied in man, (25) combined with adenoviruses producing hybrid viruses even more capable of causing cancer in hamsters, (26) and the hybrids thus created were present as contaminants in human adenovirus vaccines (26). In addition it was learned that adenoviruses could not be grown in Rhesus monkey kidney cells in the absence of SV40. (27) It was also learned that SV40 would transform normal cells in virto into cells with many if not all the characteristics of cancer cells. (28) In short SV40 presented a situation of grave seriosuness. Millions of doses of vaccines containing SV40 were injected into humans. The consequences of these injections are still unknown.

Faced with the overwhelming evidence of potential problems with adenovirus vaccines the Division of Biologics Standards stopped releasing adenovirus vaccines to the public. But even in this act it showed an administrative uneveness that subjected additional people to whatever dangers might have existed. The last lot of adenovirus vaccines was released on September 16, 1963 (Lot 029) Weyth). However, the DBS continued to allow lots of combined adenovirus and influenza vaccine subject to the same doubts as adenovirus vaccine alone to reach the public for 11 months. DBS released the last lot of combined adenovirus-influenza vaccine on August 10, 1964 (Parke Davis Lot 030106).

There is still no clear answer to the question of how the injection of SV40 might have affected its recipients. One study found a statistically significant ($X^2$12.182, P 0.005) (the probability that the findings will occur by chance are 1 in 2000) increase in leukemia of children inoculated with SV40 contaminated poliovirus vaccine when compared with a comparable control group of children inoculated with vaccine uncontaminated with SV40. It concluded that there is reason to continue careful surveillance of the potential of SV40 to cause cancer in man (8).

C. RELIANCE ON THE INACCURATE CCA TEST

In November of 1960 publication of a third piece of important work by Dr. Eddy was blocked. In an abstract intended for publication by the American Association of Immunologists she wrote, "Two vaccines were tested by the CCA (chicken cell agglutination) method in four different laboratories. Comparing the average values obtained in the different laboratories, one vaccine appeared to be from 1.4 to 2.6 times more concentrated than the other. The variation in some of the individual tests were even greater. (29)

This detailed examination was of great importance. It demonstrated that the primary test for measuring the potency of influenza vaccines varied widely depending on who administered it and under what conditions. This meant that there was no way to know whether the influenza vaccine in public use was of the proper potency. Such a discovery should have had great impact not only on the DSB regulatory mission but also on the entire scientific community interested in influenza vaccine. Instead it was ignored.

On November 21, 1960 Dr. Eddy's supervisor Dr. Joseph Smadel wrote on the abstract, "This abstract summarizes data which, in the present state of knowledge, can only be considered as of little consequence to immunologists attending the Federation meeting. Hence, it would reflect no credit on the author, the DBS, or the NIH to publish such an abstract in the Federation Proceedings or to read the paper before the immunologists. The abstract is not approved for submission to the DBS Editorial Board or to the American Association of Immunologists." (29) From that time to the present the CCA test has been caught in major, behind the scenes scientific controversy.

Dr. Eddy wrote to the Director of the DBS, Dr. Roderrick Murray, two days later saying "I attended a meeting in Stockholm two years ago and I know that there are people who are interested in the CCA test and judging from the discussion at that meeting there would be interest in a test to replace it." (31) The accuracy of Dr. Eddy's observation was underlined by the sworn testimony of Dr. Nicola Tauraso, the official currently responsible for the regulation of influenza vaccine for use in the United States eleven years later.

During the hearing in the matter of J. Anthony Morris in February of 1971 Dr. Tauraso described a comparison CCA test run by himself and industry representatives. "When they (the manufacturers, knew that these were their vaccines, they had 400 (CCA value equal to the reference) and when they didn't know, they had what I thought was a more realistic CCA value (they got 18 and 19." (32) Dr. Tauraso believes that he has found what the problems were with the CCA test system. He has been unable to demonstrate conclusively that he is correct. Even if he were correct, the blocking of Dr. Eddy's discovery from scientific scrutiny might well have contributed to the long delay in correcting the problem. Dr. Tauraso suggested the consequences of this situation when he wrote, "in my opinion, manufacturers over the years had been submitting vaccines containing less and less antigen because they realized that they could get away with it." (33)

Dr. Tauraso now asserts that the CCA test is effective. During the Morris hearing he said, ". . . I would like to put something into the record at this time: that there is very little problem in influenza vaccine testing today. We can insure that the public gets consistently potent killed vaccine, and I am quite confident that we would never have been able to achieve it without my laboratories working over the last couple of years. I am going on the record to state that." (34) "I think for the first time in many years . . . since 1968 we have been able to insure that the public gets potent influenza vaccines consistently. I think those are two keys, potent and consistent." (35) (op. cit. page 895). The CCA test is still held in doubtful esteem even though it is relied on as the primary tool to ensure the potency of influenza vaccine released to the public.

In 1968 Lee and Tauraso published a paper (36) reporting results obtained in hemagglutination tests with influenza virus. Comment on this paper in 1971 Dr. Walter Dowdle of the WHO International Influenza Center in Atlanta, Georgia, cautioned the scientific community that the techniques and results reported in the Lee-Tauraso paper "may create a biased impression." (37) It is possible that reliance on the CCA test might lead to error in the formulation of influenza virus vaccines.

The CCA test has always been shrouded in confusion. Dr. Tauraso also testified that the

CCA test results that he got when first in charge of regulating vaccines "were low." "My position, at the time," he said, "was that I could not pass any of these vaccines on test results." Dr. Tauraso's solution to the problem of these unsatisfactory tests was to recommend "that since the Division had the power to suspend the potency tests that they ought to suspend the potency tests for one year, the in-house potency tests, for the purpose of vaccine release." (38)

The implications of this recommendation are startling. Dr. Tauraso made the recommendation because of his belief that the public had been getting "watered" vaccine for a number of years. (38) Faced with this belief his choice was to suspend all testing of vaccines at the DBS—not to stop the release of what he believed to be "watered" vaccines. This seems to be a curious choice for the representative of an agency charged with protecting the health and safey of the public, particularly since manufacturers of vaccine were required by DBS regulation to rely on the inaccurate tests. But there is even more that is curous about the CCA test.

On the third of July 1965 a CCA value for influenza reference vaccine (Reference vaccine CCA–8) was developed by experimental observation in DBS laboratories. That value turned out to be 317, the middle of the range of 290 to 380. (40) Seventeen days later Dr. Roderick Murray, Director of the Division of Biologics Standards, informed all licensed manufacturers how to correct their test for the fact that the new reference Lot CCA8 had a different value from the old reference Lot CCA6. He wrote, "If the value for Lot CCA6 is corrected to labeled value of 900 CCA units/ml, the value assigned to Lot CCA8 should be 700 units/ml. This value will appear on the label of Lot CCA8 in order to maintain continuity with previous reference lots. *It is recognized that the true value may be lower.*" (41) (emphasis added)

This meant that the labeled value of the potency of the vaccine would remain high (900 CCA units/ml) even though everyone recognized that the actual value, as nearly as could be determined by DS laboratories, was much lower (317 CCA units/ml). This raises the question of why vaccines labeled in this way should not be considered misbranded under the Food, Drug and Cosmetic Act. This question, as important as it is, was a side issue to what then occurred between the Division of Biologics Standards and the manufacturers of influenza vaccine.

On December 10, 1965, Dr. John C. Wagner, Assistant Director of the DBS, wrote to Dr. A. H. Brueckner then chairman of the Pharmaceutical Manufacturers Viral Study Group to seek his aid in working out a more useful Lot CCA8 value. Dr. Wagner wrote, "Admittedly the value of 700 units/ml was assigned rather hurriedly earlier this year on the basis of DBS testing data." (42) He then suggested a course of action to correct the situation as he saw it. "We will begin by asking the question, are manufacturers satisfied with the CCA value that is currently assigned to Lot-8? If yes we will continue to use this value. On the other hand if the answer is no then we must begin immediately to collect data upon which a new value can be established." (42) Then Dr. Wagner underlined the experimental difficulties of the CCA test. He said, "Only three manufacturers have reported results of their comparative CCA determinations for Lots CCA6 and CCA8, and these differed significantly from the values we reported in our memorandum of July 20, 1965." (42)

Dr. Wagner's memorandum presented a remarkable situation. Experimentally the CCA test gives different results to different people at various times. (This remains the case today). As far as DBS was concerned this scientific imprecision was acceptable unless the manufacturers found it unacceptable. And finally if the manufacturers did not like the situation they could propose a remedy which they did like. Dr. Eddy had been blocked over her objections from bringing the potential for just this kind of confusion to the attention of the scientific community five years earlier because it was claimed to be of little interest.

When the manufacturers responded to Dr. Wagner's letter they included results of their CCA testing on reference vaccine Lots CCA6 and CCA8 which again underlined the unreproducibility of the CCA test. CCA tests done in laboratories of Parke Davis, Merck Sharp and Dome, Winthrop, National Drug, Lederle and Eli Lilly laboratories (six of the eight manufacturers of influenza vaccine) results on Lot CCA6 which ranged from a low of 444 units to a high of 733 units and on Lot CCA8 which ranged from a low of 140 units to 535 units. (45) Commenting on these results Dr. Brueckner said, "There are some differences in degree in the results obtained in the different laboratories but there are no exceptions to the finding that the 700 unit value is significantly higher than the experimentally determined values." (46)

He also argued that "representatives of several manufacturers have questioned the necessity for using CCA unitage for release of product and for labeling purposes. It has been suggested that the formula for vaccines might be expressed in CCA values of the various strains only to establish the proportions of such strains and the mouse potency test should be the only criterion for release." (46) (It should be pointed out as an aside that the mouse potency test is also a subject of some controversy. Dr. Tauraso now in charge of influenza testing at DBS calls the test "completely worthless." (47)) Dr. Brueckner felt that the better way to handle the situation was to allow "The usefulness of the CCA determinations in the manufacturing process (to) be determined by the manufacturer, as in the case of Lf values, density standards and other in process testing procedures." (46) In short, by this procedure, he suggested the manufacturers of influenza vaccines be left to determine the potency of influenza vaccines, by setting arbitrarily the CCA value of the reference vaccine.

On March 30, 1966, two and one half months later, Dr. Brueckner again wrote to Dr. Wagner having apparently received no answer to his earlier letter. This time he reported that "During the meeting last week of the Biological Section of PMA (Pharmaceutical Manufacturers of America) which was attended by representatives of all licensees, there was considerable discussion of the value to be assigned to the Lot CCA8 Reference. It was the final consensus of opinion that the assigned value should be changed from 700 CCA to 350 CCA." (49) DBS Director Murray responded to this recommendation one month later by recommending to licensed Manufacturers that the value of Lot CCA8 be set at 325 CCA units/ml. (50)

This entire exchange between the DBS and the licensed manufacturers suggests a number of serious deficiencies in the regulation of influenza vaccine. First, it suggests that the CCA test itself is of little value determining the real potency of influenza vaccines. Second, it suggests that the labeling on the vaccine vial itself is arbitrary and artificial reflecting and administrative judgment rather than any real scientific figure. Third, it suggests that the DBS is more willing to respond to the probing of the industry it regulates than the scientists in its own laboratories. At best the DBS reliance upon PMA suggestions is unfortunate. The fact that the entire CCA controversy was at least in part allowed to fester because Dr. Eddy's work calling attention to the problem and seeking the development of an alternative was blocked from publication by a DBS official makes the situation doubly unfortunate. Failure to place the CCA test in its proper limited prospective is another example of scientific failure at DBS. There is no indication in succeeding requirements that these preservative regulations are not still in force.

D. CONFUSION OVER PRESERVATIVE REGULATIONS

Section 5.1 of the Minimum Requirements: Influenza Virus Vaccines, Type A and B of May 15, 1947 states, "Preservative. In addition to the solution of formaldehyde used for inactivation, if it is used, the finished vaccine may contain not more than 1:10,000 sodium ethylmercurithiosalicylate or 1:12,500 phenylmercuric borate. A phenolic compound shall not be used." (51)

However, efforts during the hearing concerning the grievance of J. Anthony Morris to determine how the preservative regulation was enforced by the DBS elicited contradictions and confusion. Asked if manufacturers of influenza vaccine were required to state the kind and amount of preservative used in their products Dr. Wagner, Assistant Director of the DBS, and the man responsible for the final release of vaccine to the public said, "I do not remember whether there is a statement requiring the requirement of a preservative or not. I would have to go back to the minimum requirement." (52)

During the same hearing Mr. Robert Scheno, counsel for management and himself a DBS investigative officer, tried to clear up the confusion. He said, "I would just like to say if a manufacturer in my experience tells the Division that they are going to use a preservative, it should appear on the protocol. If it is not required and the manufacturer says he is going to use preservatives, then we should know what preservative is used. It should agree with his license application. And the value should be given on the protocol." (52) (ibid)

Dr. Roderrick Murray, the Director of the Division of Biologics Standards, took an opposite position on the matter of preservatives. He said, "It (a test by DBS regulators for preservatives) was not a required test, and the fact that the manufacturer did not place the statement of the preservative on the protocol is of no consequence because the method of preparation is fully set forth in the license application and the amendments, and that would be taken as constant for all odds." (sic) (53)

Thus a DBS investigator testifies that from his experience preservative data should be included on the protocols of manufacturers. The Assistant Director of the DBS, who for years has been responsible for reviewing protocols and releasing them to the public does not know whether the preservative data is required to justify release. Finally the Director of the DBS says flatly that the data are not required.

This conflict of opinion has more than theoretical importance. For several years, Dr. Casper Hiatt, then of the DBS, reviewed every influenza protocol and marked the DBS internal transmittal sheet of almost every such protocol "Satisfactory" or "Not Satisfactory." Several of those marked not satisfactory stated, "The protocol contains no statement concerning preservative. Hold for additional data" or similar language indicating that he thought it was his function to approve or disapprove influenza vaccine on the basis of whether or not the preservative data was included on the protocol." (53) (ibid 53) (influenza protocols made part of record).

Asked about this apparent belief of Dr. Hiatt's, Dr. Murray offered an explanation. He said, "Dr. Hiatt was collecting information as a project. This was more or less of an investigative matter as to whether there was any variation in the amount of preservatives in the vaccines . . . I am not trying to be cute, but I think you know scientists as well as I do and they very often do things that appeal to them and do not stick to strictly rigid protocol. I personally would have preferred to have it on a separate piece of paper, but actually, for all practical purposes, this (one of the papers marked by Hiatt) could have been thrown away. The

primary records were in the laboratory books." (51)

Whether Dr. Hiatt thought he was performing a regulatory function or an investigative function, the confused DBS internal procedures on preservatives raises serious question about public welfare. If Dr. Hiatt felt he had important reasons for withholding a vaccine from public use it might well be that the public should not have received the vaccine. Conversely, if there was no proper reason for withholding the vaccine but Dr. Hiatt was attempting to withhold it then his effort was to improperly use his authority to attempt to advance his own personal research activities. Either way the public stood to lose.

Concerning the "laboratory books" mentioned by Dr. Murray they probably hold the answer to the question. If the vaccines being reviewed by Dr. Hiatt were in fact contaminated with trace metal (perhaps resulting from excessive use of preservatives) the laboratory books will show it. When these were sought for detailed examination access to them was denied, although an earlier cursory perusal had been permitted. That perusal suggested the possibility that some vaccine released had an excess of trace metal contamination.

In any case the confusion over preservative requirements revealed by divergent DBS responses about preservative reporting and testing requirements raises serious questions in an important area. The importance of preservatives for all vaccines was underscored by Federal District Judge Charles H. Tenney. The judge awarded a plaintiff $650,000 for damages caused by a preservative added to a vaccine in a way that caused very serious brain damage. There should be clear regulation to insure that substances of such great potential danger are used safely.

E. FAILURE OF DBS TO RESPOND TO INFORMATION ON INEFFECTIVENESS OF INFLUENZA VACCINE

The limited benefits derived from the use of inactivated influenza vaccine was first brought to the attention of the responsible administrative officers of the Division of Biologics Standards in 1963 (54). The information available at that time was considered inconclusive by the DBS administrators because the immunologic basis for the failure of the vaccine to induce appreciable resistance to infection in the vaccinees was not provided. In late 1963, studies were undertaken under DBS auspices to accumulate the needed information.

By the winter of 1966, sufficient data had been collected and analyzed to conclude definitely that influenza vaccine as it was then (and as it is still, in 1971) constituted could not induce in man appreciable resistance to influenza. Dr. J. Anthony Morris brought these findings to the attention of the Director of the DBS (55) who did not respond. Two days later, however, the Director relieved Dr. Morris of all activities concerned with influenza vaccine (56) and took from him all records, sera, viruses, books and protocols of work accomplished concerned with influenza, including those Dr. Morris had collected at personal expense.

The Director gave as his reason for relieving Dr. Morris of this responsibility the following ". . . people responsible . . . on the release of products had such great difficulty in communicating with Dr. Morris . . ." (56) The real reason for removing the materials and records needed to continue work with influenza vaccine appears to be the refusal of the Director to accept Dr. Morris' judgment arrived at after 4 years of careful and painstaking work that use of influenza vaccine did not, to any appreciable degree, protect man against influenza.

Soon after the meeting at which the Director of the DBS was told of the ineffectiveness of influenza vaccine, and following the confiscation of Dr. Morris' records and biologic reagents needed to study influenza vaccine, bureaucratic interference intensified so that it was impossible to carry out already conceived programs of work aimed at defining at the molecular level the basis for the failure of influenza vaccine to induce in man resistance to influenza virus infection. These studies were directed towards the development of an improved influenza vaccine.

The evidence of influenza vaccine ineffectiveness is as follows:

The first influenza vaccine was prepared more than 30 years ago (57–1). Soon thereafter, and before the benefits and risks associated with its use were determined, this vaccine came into general use. As early as 1944, however, evidence began to accumulate that suggested use of this vaccine was not accompanied with reduced susceptibility to influenza virus infection. If such a reduction in susceptibility did occur (57–2) its persistance was of a very short duration, usually 2 to 12 months. It was with this finding (hedged by the important qualification, if such a reduction in susceptibility did occur) that the practice of annual vaccination against influenza was begun—and has continued to the present day. It is important to recall that this practice came into general use in spite of solid evidence gathered in 1944 from experimental studies in man that showed 4 months after clinically diagnosed influenza induced by inhalation of influenza virus, a third of the people involved in the study exhibited illness again when exposed to the same virus (57–3). Similar results were reported in 1946 (57–4) and other observers (57–5) identified second bouts of naturally acquired influenza within a year after an attack by a closely related virus. A vaccine can hardly be expected to induce a greater degree of protection against influenza than that which follows naturally acquired disease.

Influenza virus infection attacks superficial tissue—essentially extra-vascular—and consequently circulating antibody, whether induced by natural disease or by vaccination, is of limited value in preventing repeated attacks of the disease. You can see that the fundamental observations concerned with the immune response in man to influenza virus, whether encountered in natural disease or by vaccination, puts severe theoretic limits upon benefits to be derived from parenteral injection of an inactivated influenza vaccine. This has been known for 20 years. Yet during the period of 1950–1970, increasing amounts of influenza vaccine were produced and injected into millions of people. It was not until 1964 when an epidemiologist on the staff of the National Communicable Disease Center in Atlanta mentioned his observations in a public forum that serious doubts began to be expressed openly that influenza vaccine had given even a little, if any, protection against clinical influenza (57–6) to the many millions of people inoculated with this biologic. For these remarks, the epidemiologist was severely castigated, even in textbooks (57–7) by the proponents of influenza vaccine. It is important to note that the epidemiologist's observations were soon confirmed in work carried out in Bethesda in 1963–1966 (57–8, 9), Atlanta in 1968–1969 (57–10).

Not only has there been little or no benefit from the use of influenza vaccine in man, but harm has resulted. The vaccine contains a considerable concentration of virus material which, although inactivated, possesses toxic properties, and, if given in sufficent quantity, may cause illness in an appreciable percentage of people, especially in children. Moreover, until recently, influenza vaccine contained (and still does in some instances) extraneous bacteria which could have been removed during the manufacturing process, but was not, because this was not required by the Division of Biologics Standards. These, too, when injected into man, cause illness. Further, the vaccine contains antigens of chicken-egg origin which may lead to sensitization, or, rarely, to marked reactions in persons already hypersensitive to such material. In addition, the egg proteins contain blood group antigens which, when injected into man, induces the formation of specific antibody directed against that antigen. In pregnant women, this can be a dangerous event and result in fetal damage. It is for this reason that pregnant women were removed from the "high risk group" (CDC Report 1962 and compare wtih CDC Report 1969). It will never be known with certainty whether the recommended injection of influenza vaccine into pregnant women induced fetal damage, and if it did occur the degree and extent of the damage. What is inexcusable is that pregnant women were placed on, and removed from, the "high risk group" without first making these determinations. The risk might have been justifiable if the vaccinated women had been protected from contracting influenza during pregnancy, but the chances are that they were not.

In addition, every inactivated myxovirus vaccine (measles, parainfluenza, and mumps) that has been studies prospectively has been shown to hypersensitize a certain percentage of vaccinated people to subsequent exposure to natural disease induced by a virus of the same type. These observations have caused apprehensions of such a grave nature that they might well serve as a basis for condemnation of all inactivated myxovirus vaccines. Yet for influenza which is caused by a myxovirus vaccine, no such prospective study has ever been performed. However, such an experiment could have been carried out on a grand scale. In 1968–1969, Hong Kong Influenza occurred in all parts of the world. In European countries, in Canada in South America, in Africa in New Zealand and in Australia the disease was clinically mild with no increase in deaths. Only in the United States was the outbreak characterized by severe disease associated with a large number of deaths (57–12). The reason for the difference is not known. And no one in an administrative position of authority has encouraged any efforts to accumulate information to base a judgment as to whether widespread vaccination as practiced in the United States might have been a factor.

In light of the evidence of the ineffectiveness of influenza vaccine, it was disturbing that in 1968 the Director of the DBS, in a public announcement, encourage the manufacture of even more of an essentially worthless vaccine (58). Moreover, the Director effectively blocked efforts to begin collaborative studies aimed at improvement of influenza vaccine which were to be carried out with scientists in other Institutes on the NIH campus, other government agencies and universities. In addition, Dr. Murray hindered Dr. Morris' efforts to publish findings which would have had the effect of discouraging widespread use of influenza vaccine. This decision did, in effect, delay for more than 3 years the appearance in the scientific literature of some of the findings concerned with the limited benefits derived from the use of influenza vaccine. Blocking such publication might have been in part responsible for the dual position of Dr. Alexi Shelokov the official who was in charge in influenza vaccine at DBS for six years (1963–1968). During that time he released the vaccine for public use. However, he has testified that "for many years I have not taken influenza vaccine myself or given it to my family." While he certified that vaccine as potent he testified that "I am not satisfied with its potency." This is a kind of bureaucratic cynicism which can lead to a lack of confidence in vaccine therapy. It is just one more in a series of scientifically disappointing positions taken by DBS officials.

F. FAILURE OF THE DBS TO DETERMINE THE NATURE OF VIRUS AND VIRUS-LIKE PARTICLES IN DUCK EMBRYO VACCINE SUBSTRATE

The DBS in 1969 received a progress report from one of its contractors (68) describing

findings in a study to determine the latent virus and mycoplasma content of primary cell cultures derived from duck embryo and other cell lines. Viral assay of the duck embryo cell cultures resulted in the recovery of cytopathic agents from 4 to 10 replicate trial cultures.

Simultaneously with the IITRI studies, a DBS investigator observed in cultured duck cells virus-like particles which were identified because the investigator was told to abandon his studies of the particles because they were "biologically inactive."

One industrial researcher observed that ducklings which had been inoculated at 1-day of age with rubella vaccine developed fatal disease. When the researcher raised questions within his company about these fatalities, he was told that they were unrelated to the vaccine.

It is possible that the agents isolated by IITRI workers, the virus-like particles observed by the DBS investigator and the deaths occurring in ducks in an industry laboratory inoculated with rubella vaccine did not affect adversely people vaccinated with rubella vaccine propagated in duck embryo cell cultures. The fact is, however, that in 2 of the 3 situations (in the laboratories of the DBS and the vaccine manufacturer) efforts to characterize the nature of the observed particles and the cause of, the duck deaths were discouraged and in the third situation (IITRI) a judgment was made within DBS that the quality of the IITRI work was poor (the determination was made after a contract in excess of $100,000 was awarded) and their contract was not re-newed based primarily on the purported finding of the presence of yet another contaminant (mycoplasma) was not detected in many of the cell cultures examined by IITRI.

The DBS resolution of the aforementioned problems associated with cell culture contaminants as they affect vaccine production revolves around the attitude of the DBS director as it is reflected in one of his statements as reported to us by a former DBS contract officer who upon informing the Director of the presence of contaminants in the duck embryo cultures was disturbed to hear him reply "We must be very careful because if we were to reveal viral contamination this would cause a severe financial loss to the producer."

G. ACTIVE DISCOURAGEMENT OF SLOW VIRUS RESEARCH

In 1962 it was recognized that "slow viruses" were potential contaminants of cell cultures employed in the manufacture of vaccines for use in man. The implications of the possibility was mentioned in annual reports to the Director of DBS for the years 1963 to 1966.

By 1965 work in DBS laboratories with one slow virus had progressed to the point that led us to write "our prime concern . . . is the behavior of man following exposure in the laboratory to the Scrapie agent (59), and to express in the 1963–1965 annual reports great concern over the possibility that "slow viruses" might very well be contaminating human vaccines of animal cell origin.

The concern over the immediate danger to laboratory workers from exposure to the scrapie agent was lessened significantly when it was learned (in 1960), that (a) man consumes scrapie agent in the form of infected lamb and mutton with no indication of immediate harm and (b) (in 1962), that the scrapie agent in other than its natural host (sheep) is, under laboratory conditions, by the oral route, poorly transmissible. However, when the exposure is parenteral the scrapie agent is easily transmitted; this is especially so in one experimental host, the mouse.

With this information readily available in the open literature it was surprising to hear the DBS Director testify in 1971 "We know little about the effect of scrapie on man, but the virus could be taken home and infect the animals." (60) With this concern for animals, it is disturbing that the Director did not exhibit equal concern to the possibility that man was being injected with "slow viruses" in the form of vaccine contaminants.

Now, it is reported that one "slow virus" (foamy virus), a common contaminant in rhesus and African-green monkey kidney cells used to produce human vaccines, displays activities similar to those of RNA tumor viruses. (61) Foamy virus resembles RNA tumor viruses in morphology, mode of replication, nucleic acid content (RNA) and in its ability to replicate most efficiently in rapidly dividing cells.

In February, 1971 (Journal of the National Cancer Institute) (62), a report was published of the isolation for the first time of a virus from man which possesses all of the characteristics of foamy virus. The virus was characterized by the authors of the report as "an unusual virus in cultures from a human nasopharngeal carcinoma." This finding was not related in the publication in any way to vaccines.

These developments make an interesting and possibly meaningful story with potential importance in vaccine control. The fact that at least one slow virus (foamy virus) has been, and might still be a common contaminant of vaccines, that a foamy virus which is known to have contaminated vaccines has been shown to be capable of multiplying in human cells (61), and that other slow viruses have been shown to possess oncogenic potential (64) raises serious questions about the ability of the current DBS administration to recognize a problem of great concern when once a problem is placed before them for consideration.

In 1961 Dr. Smadel recognized the potential importance of slow viruses as possible vaccine contaminants and encouraged their study. This work resulted in findings which were reported in five papers. Following Dr. Smadel's death and concomitantly with the realization that the importance of slow viruses as vaccine contaminants was not only potential, but real, the attitude of the DBS administration towards slow virus work changed abruptly.

This attitude was characterized later by a statement made by the Director in 1971, "On one occasion I was taking some visitors through the basement and they wanted to look inside a trunk type deep freeze and I obliged . . . and on top of some boxes that were marked J. A. Marris, scrapie virus. I was shocked and I got in touch with the laboratory chief and I hoped that the visitors did not see that. (63).

Dr. Murray should not have been shocked. The agents were known to present no hazard to laboratory workers. And the potential of these agents to contaminate vaccines was known and had been reported to the director. The scrapie agent should have played an important part in DBS research and the director should have known this.

This is particularly so when the warnings of another NIH worker are considered. "Although eradication of an acute virus disease by mass immunization may be expected, on the one hand, to eradicate a slow, latent or defective infection with the agent and its delayed or slow pathological consequences, the producting low level immunity and inoculation of live virus by low virulence may contribute on the other hand, to such slow diseases. Current immunization practices may be provoking agents of such potential dangers, rather than suppressors. Thus, attempted prevention would not be better than cure." (69–2)

The foamy viruses are now characterized as "this long neglected group of viruses in oncogenesis and chronic diseases" (61) Part of this neglect is due to the action of the Director of the DBS which brought to a stand-still all slow virus research in the DBS when it was brought to his attention that slow viruses might very well be contaminants of all virus vaccines propagated in cultured cells.

H. THE DISCOURAGEMENT OF IMPORTANT SCIENTIFIC WORK BY DBS

DBS leadership has often failed to encourage research into areas which initial results would single out as important. This failure seems on occasion to be most pronounced when the preliminary scientific suggestion questions the efficacy or safety of a currently marketed or soon to be marketed vaccine. This combination of factors suggests that in some instances scientific determinations are not the overriding considerations that underlie DBS policy.

There are several important examples of this combination of factors. When Dr. Bernice Eddy found live poliovirus in poliovirus vaccine she was removed from control work on the vaccine. When she discovered that the material from which poliovirus and adenovirus vaccines were made could cause cancer in rodents she was removed from all control work. When she wished to report that there was no effective method to test for the potency of influenza vaccine her attempt at publication was blocked. Each of these discoveries had the potential of cutting back on vaccine use for scientifically valid reasons.

Conversely when Dr. Eddy discovered polyoma she was hailed. This discovery had no direct impact on the regulatory control work which she carried on in her laboratory and posed no threat to the use of vaccines. Similarly when Dr. Eddy developed a polio immunoglobulin she was rightly rewarded. This discovery posed no obstacle to the development of poliovirus vaccines.

When Dr. J. Anthony Morris presented evidence that influenza vaccine was ineffective he was relieved from his influenza vaccine control activities. When he suggested that slow viruses might contaminate vaccines his work on that project was stopped.

Other workers at DBS found their efforts blocked when they suggested problems with vaccine therapy. When one researcher discoverded flourescen particles in duck embryo cells that might possibly contaminate vaccine made in these cells he was blocked from coloration of the studies to determine the nature of the particles. When a DBS contract officer raised questions about the possibility of contamination of certain vaccine lots he was amazed to be greeted with an expression of concern from the DBS director for what such a discovery would mean to the financial well-being of the manufacturer involved.

In short, on a number of occasions the DBS leadership has allowed its passionate commitment to vaccine therapy to obscure its responsibility to ferret out and track down the cause of any possible danger or inefficacy that might be associated with use of vaccines. Only by a firm resolve to route out each and every potential weakness of vaccines can the DBS insure that part of medical science will perform the most possible good for the public health. The lethargy of the DBS in following up suggestions of problems has created a situation which has begun to place the credibility of vaccine therapy in jeopardy.

One particular idea about vaccine regulation has been expressed with enough frequency as to require some close scrutiny. It has been suggested on a number of occasions that an individual who does not believe in the efficacy of the influenza vaccine, for example, should probably not be in a position to regulate it. This is a dangerous idea. Shortly after Dr. Eddy began to question the ability to measure influenza vaccine potency to her superiors, Dr. J. Anthony Morris was assigned to relieve her of the responsibility for regulating the vaccine. At that time he believed that the vaccine was effective. Gradually, based on his *scientific observa-*

tions, he changed his mind and came to believe that the vaccine did not in fact afford the degree of protection the public had been led to expect on the basis of USPHS pronouncements.

Shortly after reporting his findings and belief to his superiors, he was relieved of the control responsibility by Dr. Shelokov. Dr. Shelokov testified about his personal belief that the vaccine was not particularly effective but never told his superiors and finally left the DBS for other reasons. Dr. Tauraso who relieved Dr. Shelokov also has expressed the belief that at the time he took over their regulation, influenza vaccines were not effective, having been "watered" by manufacturers for years. He, however, believing strongly in the notion the vaccine was basically sound, chose to blame Dr. Morris and put into high gear the effort to reduce Dr. Morris to a position of impotence within the DBS. In short, relying on the notion that a person who does not believe in the efficacy of a vaccine cannot regulate it lies at the heart of a ten year disruptive controversy in DBS with profound implications for the public health.

The falacy of the notion can be exposed by some careful thinking. If the influenza vaccine is in fact ineffective, a possibility which cannot be denied, then to require regulation by only those who believe in it would be the same as to require the regulation of the vaccine by only those who are ignorant. Clearly the proper principle to be applied in establishing the proper regulations is that only a person who bases his position on sound scientific data and reasoning should be allowed to regulate vaccines.

If those data reveal the vaccine to be ineffective then attention should be focused on the vaccine and not on the scientist making the discovery. The news and not the messenger should occupy the center of attention. Unfortunately DBS has not, for the highest of motives probably, seen fit to allow development of this kind of scientific inquiry in a number of instances. Apparently, because of a strong belief in the need to protect vaccines from adversity the agency appears to minimize any potential vaccine problem. This procedure, undertaken for even the best of motives, is unscientific and leaves the agency vulnerable to criticism. To the extent that action of this type taken by the agency succeed they will achieve the very goal which the DBS seeks to avoid—the discrediting of vaccine therapy.

I. WORKING CONDITIONS AT DBS

The cases of Dr. Morris and Dr. Eddy have been detailed. Both lost great amounts of support from the DBS after taking positions which were not in favor with the agency leadership. Yet they chose to stay. The situations of Dr. Hiatt and Dr. Shelokov have been suggested. Both chose to leave DBS after what many outside observers felt were gallant efforts to work under adverse conditions. There are others who are available to discuss the DBS situation. All scientists who have had or do now have any relationship with DBS should be contacted for an evaluation of the situation.

J. ADDITIONAL ITEMS

1. Varicella virus (chicken pox) vaccine live

On October 9, 1969, Dr. Charles P. O'Malley of DBS wrote to Dr. Charles P. Balant of Merch Sharp and Dohme (Research Government Liaison) asking comment on 13 points of interest. The letter implied that clinical testing of the varicella virus vaccine—live—should not begin until the thirteen points are adequately answered.

Examples of the points included are:

"With reference to the monkey neurovirulence test . . . Is evidence available that these lesions are due to vaccine virus?" "Have animal studies been conducted with the wild and A. W. strains?" "Has consideration been given to developing tests to determine if a chronic latent infection develops following the inoculation of this vaccine strain?"

In response to these comments the investigator responsible at Merch Sharp and Dohme wrote a reply memo to the DBS questionnaire and gave it to his superiors in the company saying that the DBS questions would not be answered satisfactorily because adequate work had not been done or because laboratory data collected would not adequately answer the questions asked. Also company superiors were reminded in the memo that many of the critical questions asked by the DBS about the varicella vaccine could have been answered by the prime investigator had they not blocked his effort to do such experiments. The memo reminded company superiors that the pathologist in charge of reading the monkey safety and neurovirulence tests concerned about lesions noted in tissue sections following inoculation with the varicella vaccine (A.W. Lot 313). He made a comment to the effect that he was always sent virulent vaccines which he and to interpret as non-virulent material. Efforts by the researcher to conduct the mild and A.W. strain comparison were termed by his superiors "a nice experiment but merely academic" and were never satisfactorily completed. The researcher reported that his superior told him concerning the chronic latent infection studies "you can't screw around with all this crap, we gotta get a product out." (69–3)

In addition it is important to note that clinical testing in humans which apparently should not have begun until after the inquiries in the October 9 letter were satisfactorily answered, had in fact, been in progress for six months. The important questions to ask about this incident are: what answer did DBS receive from the company concerning the vaccine? How did it compare to the draft compiled by the responsible investigator? Did the DBS know that the clinical trial in humans had begun before they apparently should have. If nothing, why? How did DBS deal with the situation once it got the official response to its inquiry?

2. Inadequacy of tests to detect avian leukosis virus in vaccine substrate

The DBS requires live vaccines of egg origin (measles, mumps, yellow-fever and smallpox) to be examined for the presence of viruses of the avian leukosis complex. The examination is carried out according to PHS Regulations, title 42, Part 73.141 (7), page 51.

"*Test for Avian Leukosis.* In the cultures were not derived from a certified source . . . , and the control fluids were not tested for avian leukosis . . ., at least 500 doses of 50 ml., whichever represents a greater volume of each undiluted vaccine pool, shall be tested and found negative for avian leukosis, using either Rubin's procedure for detecting resistance Inducing Factor (RIF) or another method of equivalent effectiveness."

Rubin's procedure is based upon the funding that certain cell culture develop an increasing resistance to Rous Sarcoma Virus (RSV) when incubated for increasing periods of time before inoculation. The factor (resistance inducing factor or RIF) which accumulated in the cell cultures is lymphomatosis virus, which in itself produces no overt signs to indicate its presence, but its ability to interfere with RSV, which does produce detectable changes, makes possible an assay of the lymphomatosis virus through its interference with the RSV indicator virus. Various strains of lymphomatosis virus and their corresponding RSV-indicator-virus, because of their antigenic and biologic variation, have been allocated to one or the other 2 subgroups, A and B, which contain 10 and 6 strains, respectively. A separate (additional) RIF test is required to detect members of each subgroup. Certain strains of the subgroups are better indicator viruses than others in the same subgroup because of the broadness of their reactivity (ability to detect other members of the same subgroup). For subgroup A the strains of choice for testing purposes are BS–RSV and RSV (RAV–1) and for subgroup B, RSV (RAV–2) and HA (RSV).

The DBS accepts as satisfactory a procedure by Dow Chemical Co., a manufacturer of measles vaccine, employing a single challenge virus (RSV–RAV–1), a virus of subgroup A that does not detect the presence of certain other members of subgroup A and none of the members of the group B. This major fault in the test system was brought to the attention of the DBS administrators by Dr. C. G. Aulisio in 1967. At that time the test deficiency was acknowledged to exist by the DBS administrators, but no action was taken to correct the deficiency then or since. Of equal seriousness, is the fact that Dr. Aulisio was told that he could not seek collaborative help within or without the DBS to evaluate the potential and real harm to vaccine recipients from the demonstrated deficiency in the test procedure.

This error of omission is compounded by the recent, and still uncorroborated, findings that man might indeed be susceptible to infection by at least one member of the avian leucosis complex of viruses. (65) Failure to demonstrate that avian leucosis viruses when injected into man (as has been done for many years with RIF contaminated yellow fever vaccine) results in the appearance of overt disease does not lessen the seriousness of the failure of the DBS to accumulate and evaluate information relating to this aspect of vaccine control. For indeed, in its natural host the chicken, in many instances, an appreciable fraction of the host's natural life transpires before overt signs of disease are observed.

2a. Neurologic findings in monkeys injected with mumps vaccine

An undesirable decrease in public confidence in vaccines results from events what are related in Dr. Whitman's memorandum of November 25, 1969, (3) in which he reports that on several occasions a pathologist at Merck Sharp and Dohme reported the occurrences of vascular cuffing and other lesions on monkeys following injection of Merck Sharp and Dohme live mumps vaccine. He suggested that the lesions could be induced by a virulent type virus and that the vaccine might be insufficiently attenuated or contaminated with a virulent wild strain of mumps virus. These findings were dismissed with the comment that "those damned pathologists don't know what they're talking about. . . . The findings would then be reviewed by another pathologist (the boss of the first pathologist) who would report that the lesions were without consequence and not referable to the test vaccine. (3) Over the protestation of the first pathologist lot after lot of mumps vaccine were released by the manufacturer and the DBS (3).

3. Dual role of the DBS as developer and regulator of vaccines

While the DBS is legally charged to develop vaccines when necessary to do so the history of the development of the rubella vaccine suggests that the existing situation has serious built-in conflicts of interest. This built-in conflict is related in correspondence of a former member of the DBS staff, Dr. Kendall Smith (66) and by a responsible investigator in a licensed vaccine manufacturer (3). Both of these correspondents allude to the poor checks and balances of the DBS system in regulating a vaccine developed by the DBS, especially when this system resulted in Merck Sharp and Dohme having a monopoly, for a considerable period of time, in the rubella vaccine market (3) and in the conditions which made it possible for a Merck Sharp and Dohme official to say "getting vaccine products licensed has nothing to do with science; it's politics . . ." and "I can assure you that our vaccine rubella will win out in the end."

ORDER OF BUSINESS

The PRESIDENT pro tempore. The Senator from Wisconsin is recognized for 15 minutes.

(The remarks of Mr. PROXMIRE when he introduced S. 2696 are printed in the RECORD under Statements on Introduced Bills and Joint Resolutions.)

TRANSACTION OF ROUTINE MORNING BUSINESS

The PRESIDENT pro tempore. Under the previous order, there will now be a period of not to exceed 30 minutes for the transaction of routine morning business, with each Senator limited to 3 minutes.

Is there morning business?

Mr. BYRD of West Virginia. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER (Mr. STEVENSON). The clerk will call the roll.

The second assistant legislative clerk proceeded to call the roll.

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

PROTECTION OF CERTAIN HORSES AND BURROS

Mr. BYRD of West Virginia. Mr. President, I ask the Chair to lay before the Senate a message from the House of Representatives on S. 1116.

The PRESIDING OFFICER (Mr. STEVENSON) laid before the Senate the amendment of the House of Representatives to the bill (S. 1116) to require the protection, management, and control of wild free-roaming horses and burros on public lands which was to strike out all after the enacting clause, and insert:

That Congress finds and declares that wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West; that they contribute to the diversity of life forms within the Nation and enrich the lives of the American people; and that these horses and burros are fast disappearing from the American scene. It is the policy of Congress that wild free-roaming horses and burros shall be protected from capture, branding, harassment, or death; and to accomplish this they are to be considered in the area where presently found, as an integral part of the natural system of the public lands.

SEC. 2. As used in this Act—

(a) "Secretary" means the Secretary of the Interior when used in connection with public lands administered by him through the Bureau of Land Management and the Secretary of Agriculture in connection with public lands administered by him through the Forest Service;

(b) "wild free-roaming horses and burros" means all unbranded and unclaimed horses and burros on public lands of the United States;

(c) "range" means the amount of land necessary to sustain an existing herd or herds of wild free-roaming horses and burros, which does not exceed their known territorial limits, and which need not be fenced, and which is devoted principally but not necessarily exclusively to their welfare;

(d) "herd" means one or more stallions and his mares; and

(e) "public lands" means any lands administered by the Secretary of the Interior through the Bureau of Land Management or by the Secretary of Agriculture through the Forest Service.

SEC. 3. (a) All wild free-roaming horses and burros are hereby declared to be under the jurisdiction of the Secretary for the purpose of management and protection in accordance with the provisions of this Act. The Secretary is authorized and directed to protect and manage wild free-roaming horses and burros as components of the public lands, and he may designate and maintain specific ranges on public lands as sanctuaries for their protection and preservation, where the Secretary after consultation with the wildlife agency of the State wherein any such range is proposed and with the Advisory Board established in section 7 of this Act deems such action desirable. The Secretary shall manage wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on the public lands. He shall consider the recommendations of qualified scientists in the field of biology and ecology, some of whom shall be independent of both Federal and State agencies and may include members of the Advisory Board established in section 7 of this Act. All management activities shall be at the minimal feasible level and shall be coordinated with the wildlife agency of the State wherein such lands are located in order to insure adequate consideration for all wildlife species which inhabit such lands, particularly endangered species. Any adjustments in forage allocations on any such lands shall take into consideration the needs of other wildlife species which inhabit such lands.

(b) Where an area is found to be overpopulated, the Secretary, after consulting with the Advisory Board, may order old, sick, or lame animals to be destroyed in the most humane manner possible, and he may cause additional excess wild free-roaming horses and burros to be captured and removed for private maintenance under humane conditions.

(c) The Secretary may order wild free-roaming horses or burros to be destroyed in the most humane manner possible when he deems such action to be an act of mercy or when in his judgment such action is necessary to preserve and maintain the habitat in a suitable condition for continued use. No wild free-roaming horse or burro shall be ordered to be destroyed because of overpopulation unless in the judgment of the Secretary such action is the only practical way to remove excess animals from the area.

(d) The remains of a deceased wild free-roaming horse or burro may be disposed of in any customary manner that is not prohibited by this Act.

SEC. 4. If wild free-roaming horses or burros stray from public lands on to privately owned land, the owners of such land may inform the nearest Federal marshal or agent of the Secretary, who shall arrange to have the animals removed. In no event shall such wild free-roaming horses and burros be destroyed except by the agents of the Secretary. Nothing in this section shall be construed to prohibit a private landowner from maintaining wild horses or burros on his private lands, or lands leased from the Government, if he does so in a manner that protects them from harassment, and if the animals were not willfully removed or enticed from the public lands.

SEC. 5. A person claiming ownership of a horse or burro on the public lands shall be entitled to recover it only if recovery is permissible under the branding and estray laws of the State in which the animal is found.

SEC. 6. The Secretary is authorized to enter into cooperative agreements with other landowners and with the State and local governmental agencies and may issue such regulations as he deems necessary for the furtherance of the purposes of this Act.

SEC. 7. The Secretary of the Interior and the Secretary of Agriculture are authorized and directed to appoint a Joint Advisory Board of not more than nine members to advise them on any matter relating to wild free-roaming horses and burros and their management and protection. He shall select as advisers persons who are not employees of the Federal or State governments and whom he deems to have special knowledge about protection of horses and burros, management of wildlife, animal husbandry, or natural resources management. Members of the board shall not receive reimbursement except for travel and other expenditures necessary in connection with their services.

SEC. 8. (a) Any person who—

(1) willfully removes or attempts to remove, except for normal and prudent husbandry needs, a wild free-roaming horse or burro from the public lands, without authority from the Secretary, or

(2) converts a wild free-roaming horse or burro to private use, without authority from the Secretary, or

(3) maliciously causes substantial harm to, or the death of, any wild free-roaming horse or burro, or

(4) processes or permits to be processed into commercial products the remains of a wild free-roaming horse or burro, or

(5) sells, directly or indirectly, a wild horse or burro maintained on private or leased land pursuant to section 4 of this Act, or the remains thereof, or

(6) willfully violates a regulation issued pursuant to this Act.

shall be subject to a fine of not more than $2,000, or imprisonment for not more than one year, or both.

(b) Any employee designated by the Secretary of the Interior or the Secretary of Agriculture shall have power, without warrant, to arrest any person committing in the presence of such employee a violation of this Act or any regulation made pursuant thereto, and to take such person immediately for examination or trial before an officer or court of competent jurisdiction, and shall have power to execute any warrant or other process isued by an officer or court of competent jurisdiction to enforce the provisions of this Act or regulations made pursuant thereto. Any judge of a court established under the laws of the United States, or any United States magistrate may, within his respective jurisdiction, upon proper oath or affirmation showing probable cause, issue warrants in all such cases.

SEC. 9. Nothing in this Act shall be construed to authorize the Secretary to relocate wild free-roaming horses or burros to areas of the public lands where they do not presently exist.

SEC. 10. After the expiration of thirty calendar months following the date of enactment of this Act, and every twenty-four calendar months thereafter, the Secretary of the Interior will submit to Congress a report on the administration of this Act, including a summary of enforcement and/or other actions taken thereunder, costs, and such recommendations for legislative or other actions as he might deem appropriate.

The Secretary of the Interior and the Secretary of Agriculture shall consult with respect to the implementation and enforcement of this Act and to the maximum feasible extent coordinate the activities of their respective departments in the implementation and enforcement of this Act.

Mr. BYRD of West Virginia. Mr. President, I move that the Senate disagree to the amendments of the House of Representatives and request a conference with the House of Representatives thereon; and that the Chair appoint the conferees on behalf of the Senate. I do this at the request of the distinguished junior Senator from Washington (Mr. JACKSON).

The motion was agreed to, and the

Presiding Officer appointed Mr. JACKSON, Mr. CHURCH, Mr. METCALF, Mr. JORDAN of Idaho, and Mr. HATFIELD conferees on the part of the Senate.

Mr. BYRD of West Virginia. Incidentally, Mr. President, the matter has been cleared with the minority leadership.

ORDER FOR SUCCESSIVE REFERENCE OF H.R. 10835 TO THE COMMITTEE ON GOVERNMENT OPERATIONS AND THE COMMITTEE ON COMMERCE

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent, this request having also been cleared with the minority leadership, that H.R. 10835, received from the House of Representatives today, be referred to the Committee on Government Operations, and that when the bill is reported by that committee, it be referred to the Committee on Commerce for 30 days, for consideration of subject matters in the bill as are within its jurisdiction, if the chairman of that committee desires such reference.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. BYRD of West Virginia. Mr. President, I yield the floor.

EXPROPRIATION BY CHILE OF AMERICAN PROPERTY

Mr. BYRD of Virginia. Mr. President, I support the sharp statement of Secretary of State Rogers in his comment on the action of the Socialist Government of Chile in denying compensation for American interests in three major Chilean copper mines. These mines were seized by the Chilean Government.

The Secretary of State described the action as "a serious departure from accepted standards of international law."

The book value of the three mines involved was $629 million, according to Chile's own figures.

The action of Chile underscores the great risk taken in 1969 when Congress approved establishment of the Overseas Private Investment Corporation.

This Corporation, wholly owned by the U.S. Government, provides insurance against certain kinds of losses which U.S. investors may suffer in other nations.

The purpose of the OPIC was to expand greatly the commitment of the U.S. Government—and hence the U.S. taxpayer—to the support of American private investment in developing countries.

OPIC was funded with fiscal year 1970 appropriations of $37.5 million and fiscal year 1971 appropriations of $18.7 million. This was in addition to $71.7 million transferred from the Agency of International Development.

Furthermore, the administration has requested an appropriation of $25 million for OPIC for fiscal year 1972.

Among the kinds of protection offered by OPIC is insurance against expropriation. Such insurance is now available to U.S. investors in at least 75 developing countries around the world.

OPIC now has reserves of approximately $170 million. But its programs involve contracts outstanding of approximately $8 billion, covering various facets of U.S. private investments overseas.

According to testimony given before a Senate Appropriations Subcommittee in June of this year, OPIC could face worldwide losses of up to $3.5 billion.

The Chilean confiscation may result in claims against the U.S. Government, through OPIC, by the U.S. firms whose property was seized. The corporations involved include copper firms, International Telephone & Telegraph, and others. The total claims could reach $275 million—a sum more than $100 million greater than the reserves of OPIC.

There is no reason to believe that the Chilean expropriation will prove to be an isolated act. U.S. private properties have been seized in the past by governments in Haiti, Guatemala, Ceylon, Brazil, Bolivia, and Peru.

Realistically, it must be assumed that there is a genuine risk that similar seizures may take place in other nations.

That could mean further large claims against OPIC in the future.

I presided in the Senate on December 12, 1969, the day on which the Senate passed legislation sponsored by the Senator from New York (Mr. JAVITS) which established OPIC. The Javits proposal was attached as an amendment to the Foreign Assistance Act of 1969. It was approved by a vote of 53 to 34.

During debate on the Javits amendment, there were many optimistic predictions about the supposedly low risk involved in providing government-backed insurance for U.S. investors overseas.

Senator JAVITS, the sponsor of the amendment, said that—

> It is expected that the corporation will make money, and indeed, pay dividends to the Treasury, rather than be a drain upon the United States.

The Senator from Wyoming (Mr. MCGEE), speaking in support of OPIC, stated that—

> I think the comments made here establish its (OPIC's) risk-taking qualities, namely, that there is almost no risk in it.

This optimism is being proven unrealistic.

Under the Javits amendment, insurance and guarantees issued by OPIC are backed by the full faith and credit of the U.S. Government.

In other words, any losses which exceed the fees paid in by insured firms must be borne by the taxpayers of the United States.

In view of the action of Chile, I believe that a squeeze play against the United States is being carried out—and that this is a pattern which may well be repeated elsewhere abroad, wherever the United States Government has underwritten American private foreign investment.

The United States has furnished substantial support to Chile in the past. The total dollar aid to Chile since World War II exceeds $1.3 billion, according to the House Appropriations Committee.

At the present time, the United States has more than $1 billion in loans outstanding to Chile. These include $387 million through the Export-Import Bank, $550 million through AID in development loans and $117.8 through the Inter-American Development Bank.

Nevertheless, Chile has seen fit to seize American property without compensation.

The status of OPIC and the events in Chile point up the extent of the so-called contingent liabilities which the U.S. Government is incurring every year.

Some of these liabilities are not included in the budget—but under adverse circumstances, they can become very real demands for Federal outlays.

In the case of the events in Chile, it appears that U.S. taxpayers will be called on to put up more tax funds as a result of the hostile actions of a foreign government.

I voted against the establishment of OPIC. I did so because I doubt that the Federal Government should become involved in the business of bailing out private companies.

The current situation is not as direct a bailout as the case of Lockheed Aircraft Corp. or Penn Central Railroad, but it almost certainly will lead to a drain on the pocketbooks of the taxpayers.

In these inflationary times, when the President is calling for sacrifices on the part of the people to combat inflation, it is incumbent upon the Congress to exercise great vigilance in passing upon legislation which establishes contingent liabilities like those involved in OPIC.

These liabilities may not always appear as items in the budget, but they can and sometimes do lead to expenditures of the tax funds paid to the Government by hard-working Americans.

QUORUM CALL

Mr. BYRD of Virginia. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The second assistant legislative clerk proceeded to call the roll.

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER (Mr. STEVENSON). Without objection, it is so ordered.

ORDER OF BUSINESS

Mr. BYRD of West Virginia. Mr. President, how much time remains under morning business?

The PRESIDING OFFICER. Five minutes remain.

Mr. BYRD of West Virginia. I thank the distinguished occupant of the Chair.

May I ask the Senator from Wisconsin (Mr. NELSON), does he wish 3 minutes to transact routine morning business?

Mr. NELSON. No; I need 15 minutes.

QUORUM CALL

Mr. BYRD of West Virginia. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER (Mr. GAMBRELL). The clerk will call the roll.

The second assistant legislative clerk proceeded to call the roll.

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

COMMUNICATIONS FROM EXECUTIVE DEPARTMENTS, ETC.

The PRESIDENT pro tempore laid before the Senate the following letters, which were referred as indicated:

PROPOSED REFORM OF MINING LAWS

A letter from the Secretary of the Interior, transmitting a draft of proposed legislation to reform the mining laws (with an accompanying paper); to the Committee on Interior and Insular Affairs.

PROPOSED REFORM OF MINERAL LEASING LAWS

A letter from the Secretary of the Interior, transmitting a draft of proposed legislation to reform the mineral leasing laws (with an accompanying paper); to the Committee on Interior and Insular Affairs.

PETITIONS

A petition was laid before the Senate and referred as indicated:

By the PRESIDENT pro tempore:

A resolution adopted by the Beauty and Barber Supply Institute, Inc., of New York, N.Y., in opposition to the closed shop for their employees; to the Committee on Labor and Public Welfare.

REPORTS OF COMMITTEES

Under authority of the order of the Senate of July 21, 1971, the bill (S. 986) to provide minimum disclosure standards for written consumer product warranties against defect or malfunction; to define minimum Federal content standards for such warranties; to amend the Federal Trade Commission Act in order to improve its consumer protection activities; and for other purposes, the Committee on the Judiciary was discharged from further consideration of the bill, and it was placed on the calendar.

INTRODUCTION OF BILLS AND JOINT RESOLUTIONS

The following bills and joint resolutions were introduced, read the first time and, by unanimous consent, the second time, and referred as indicated:

By Mr. MATHIAS:

S. 2692. A bill to protect the public health and safety by amending the narcotic, depressant, stimulant and hallucinogenic drug laws in the District of Columbia, and for other purposes. Referred to the Committee on the District of Columbia.

S. 2693. A bill to establish the Office of Youth Commissioner in the District of Columbia, to establish the Youth Commission, and for other purposes. Referred to the Committee on the District of Columbia.

By Mr. BENTSEN (for himself and Mr. TOWER):

S. 2694. A bill to designate the Veterans' Administration hospital in San Antonio, Tex., as the Audie L. Murphy Memorial Veterans' Hospital. Referred to the Committee on Veterans' Affairs.

By Mr. BYRD of West Virginia (for Mr. JACKSON, for himself and in behalf of Mr. ALLOTT) (by request):

S. 2695. A bill to provide for the division of assets between the Twenty-Nine Palms Band and the Cabazon Band of Mission Indians, California, including certain funds in the U.S. Treasury, and for other purposes. Referred to the Committee on Interior and Insular Affairs.

By Mr. PROXMIRE (for himself, Mr. CANNON, Mr. HARRIS, Mr. HARTKE, Mr. HUGHES, Mr. KENNEDY, Mr. MANSFIELD, Mr. McGOVERN, Mr. METCALF, Mr. PELL, Mr. PERCY, and Mr. MOSS):

S. 2696. A bill to provide a program of pollution control in the river basins and waterways of the United States through comprehensive planning and financial assistance to municipalities and regional water basin management associations for the construction of waste treatment facilities. Referred to the Committee on Public Works.

By Mr. HUGHES:

S. 2697. A bill for the relief of Marie Tjernagel and others. Referred to the Committee on the Judiciary.

By Mr. CURTIS:

S. 2698. A bill to amend the Internal Revenue Code of 1954 to provide for a reduced rate of tax for gasoline which contains grain alcohol and no lead. Referred to the Committee on Finance.

By Mr. ANDERSON (for himself, Mr. MONTOYA, and Mr. BENTSEN):

S. 2699. A bill to authorize the acquisition of lands within the Vermejo Ranch, New Mexico and Colorado, for addition to the national forest system, and for other purposes. Referred to the Committee on Agriculture and Forestry.

By Mr. FULBRIGHT (by request):

S. 2700. A bill to extend diplomatic privileges and immunities to the Mission to the United States of America of the Commission of the European Communities and to members thereof. Referred to the Committee on Foreign Relations.

STATEMENTS ON INTRODUCED BILLS AND JOINT RESOLUTIONS

By Mr. MATHIAS:

S. 2692. A bill to protect the public health and safety by amending the narcotic, depressant, stimulant, and hallucinogenic drug laws in the District of Columbia, and for other purposes. Referred to the Committee on the District of Columbia.

Mr. MATHIAS. Mr. President, I introduce for appropriate reference a bill to protect the public health and safety by amending the narcotic, depressant, stimulant, and hallucinogenic drug laws in the District of Columbia, and for other purposes.

This legislation was submitted by the Department of Justice. An identical bill is being introduced in the other body by the distinguished ranking minority member of the House Committee on the District of Columbia, Representative ANCHER NELSEN.

As the Attorney General outlined in his letter of transmittal on October 12, the purpose of this legislation is to bring the drug control laws of the District of Columbia into accord with Federal law as revised by the Comprehensive Drug Abuse Prevention and Control Act of 1970. The proposed District of Columbia legislation is also very similar to the model State act recommended in August 1970 by the National Conference of Commissioners on Uniform State Laws and already enacted in some 26 jurisdictions.

In accord with the thrust of the 1970 Federal law—Public Law 91–513—the proposed District of Columbia bill establishes five schedules encompassing marihuana and all of the narcotic, depressant, stimulant, and hallucinogenic drugs currently controlled at the Federal level. Regulatory provisions are proposed to govern legitimate manufacturers, distributors, and dispensers of these controlled substances within the District of Columbia. Criminal violations and sanctions included in this bill closely follow those of Public Law 91–513, including the distinctions in the Federal law between trafficking and possession and among offenses involving different classes of drugs.

In short, this legislation proposes a sweeping reform of the drug control laws of the District of Columbia to meet contemporary needs and bring the District's laws into conformity with those of the Federal Government and many States. This is an important objective, for effective drug control laws are essential in the battle against drug abuse and drug-related crime.

Equally important, in my judgment, is effective rehabilitation and treatment of drug offenders and drug-dependent individuals. Within the District of Columbia, the Narcotics Treatment Administration has made substantial progress in developing rehabilitation programs and facilities. During the past 19 months, for example, the number of heroin addicts in active treatment in NTA programs has increased from 150 to over 3,500. This progress was appropriately recognized last week by Dr. Jerome H. Jaffe, Director of the Administration's Special Action Office, who stated that:

> NTA's programs have become a national model for the rapid development of a large multimodality heroin treatment effort.

Dr. Jaffe also praised the development of a regional registry of addicts in the Washington area and efforts to coordinate treatment programs in the Washington-Baltimore corridor. Such steps of course, are vital to a comprehensive regional attack on the problem of drug abuse.

Last year the Committee on the District of Columbia began consideration of comprehensive drug control and rehabilitation legislation, but the press of other business prevented the committee from completing that work in the 91st Congress. The administration's legislation which I introduce today will provide a foundation for committee hearings and an exploration of all alternatives, in the context of Public Law 91–513 and the current status of NTA programs and other efforts in the Washington region. I look forward to working with the administration and my colleagues on the District of Columbia Committee to perfect and enact sound, effective legislation.

I ask unanimous consent to have printed in the RECORD copies of the Attorney General's letter of transmittal, a summary of the proposed "D.C. Controlled Substances Act," and Dr. Jaffe's letter of October 6 to Dr. Robert L. DuPont, Director of the Narcotics Treatment Administration.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

OFFICE OF THE ATTORNEY GENERAL,
Washington, D.C.

The VICE PRESIDENT,
U.S. Senate,
Washington, D.C.

DEAR MR. VICE PRESIDENT: Enclosed for your consideration and appropriate reference is a legislative proposal to protect the public health and safety by amending the narcotic, depressant, stimulant and hallu-

cinogenic drug laws in the District of Columbia.

As with other densely populated urban areas throughout the United States, drug abuse continues to plague the District of Columbia. Cooperative efforts through law enforcement and rehabilitation have had a measurable effect on this problem, thereby contributing to the reduction of street crime in the Nation's Capital during the past year. Nevertheless, greater inroads must be made if the District is to become the "proud, glorious city" envisioned by the President in his recommendations for the District of Columbia of January 31, 1969.

During the 91st Congress, a sweeping reform of Federal drug control laws took place with the enactment of Public Law 91–513, the Comprehensive Drug Abuse Prevention and Control Act of 1970. Using title II of this measure as a guide, the National Conference of Commissioners on Uniform State Laws on August 7, 1970, approved the Uniform Controlled Substances Act and recommended its enactment in all the States.

The District of Columbia is no less deserving of legislative reform in the drug control area than the States. Indeed, there is, if anything, a greater need for the laws of the Federal City to dovetail with Federal statutes if the drug abuse epidemic is to be further curtailed.

The attached draft bill is modeled after the Uniform Controlled Substances Act with appropriate modification for the particular circumstances of the District. The penalties for violations are consistent with those in Federal law and the administrative procedures properly interrelated with their Federal counterparts.

Twenty six jurisdictions have already enacted the Uniform Controlled Substances Act, and others will undoubtedly follow suit during their current legislative sessions. In order that the District of Columbia may be in the vanguard of those States moving forward to join laws as well as forces against drug abuse, I urge prompt enactment of this legislation.

The Office of Managemest and Budget has advised that enactment of this proposed legislation would be consistent with the Administration's objectives.

Sincerely,

ATTORNEY GENERAL.

SUMMARY OF THE PROPOSED "DISTRICT OF COLUMBIA CONTROLLED SUBSTANCES ACT"

The proposed legislation consists of six separate articles, four of which are addressed to different facets of the control of narcotics, marihuana, and depressant, stimulant, and hallucinogenic drugs. Article I contains all the definitions necessary for the bill's implementation and, for the most part, tracks the language of the definitions section of the Comprehensive Drug Abuse Prevention and Control Act of 1970 (P.L. 91–513), enacted on October 27, 1970.

Article II contains five drug schedules which list all those narcotics, marihuana, and depressant, stimulant, and hallucinogenic drugs currently controlled under P.L. 91–513. The schedules range from schedule I, containing those substances having the highest abuse potential and no accepted medical use in the United States, to schedule V, containing those substances having the lowest abuse potential and the lowest psychological and/or physiological dependence liability relative to substances listed in other schedules. The Article also vests the authority to administer the Act and control drugs in the Commissioner of the District of Columbia. However, in the case of drugs and substances controlled or decontrolled under P.L. 91–513, the Commissioner's authority must be exercised in a manner consistent with the Federal scheme.

Article III sets out the regulatory provisions governing legitimate manufacturers, distributors, and dispensers of controlled substances within the District of Columbia. Registration requirements are imposed on all legitimate drug handlers, but the criteria are substantially similar to the criteria contained in P.L. 91–513. The criteria to be considered by the Commissioner in registering manufacturers and distributors include such things as (1) maintenance of effective controls against diversion, (2) compliance with District of Columbia law, (3) prior conviction records, (4) past experience in the manufacture or distribution of controlled substances, (5) material fraud in an application, (6) suspension or revocation of a Federal registration, and (7) other factors consistent with the public health and safety. A registration under Article III may be suspended or revoked by the Commissioner upon a finding that the registrant materially falsified his application, was convicted of an offense relating to controlled substances, or had his Federal registration suspended or revoked.

Article III also imposes on registrants certain additional requirements, such as labeling, packaging, and recordkeeping. However, compliance with the labeling, packaging, and recordkeeping requirements of P.L. 91–513 is to be deemed compliance with this act.

Article IV contains the criminal violations and sanctions, which closely parallel the penalty sections of P.L. 91–513. Three sets of prohibited acts and penalties are set out: prohibited acts A, which relate to trafficking offenses; prohibited acts B, which relate to registrant offenses; and prohibited acts C, which relate to the fraud offenses. Under prohibited acts A, the penalty for any given trafficking offense is determined by whether the drug involved is a narcotic or nonnarcotic substance and by the schedule in which the drug is listed. For example, the penalty for unlawful manufacture, distribution, or possession (with intent to manufacture or distribute) of a narcotic substance in schedule I or II is imprisonment for not more than 15 years, a fine not exceeding $25,000, or both. The penalty for the same offenses in connection with a non-narcotic schedule I or II substance, which includes hallucinogens and marihuana, and any schedule III substance, is imprisonment for not more than 5 years, a fine not exceeding $15,000, or both.

Simple unauthorized possession of any controlled substance under the bill is punishable as a misdemeanor by imprisonment for not more than 1 year, a fine not exceeding $5,000, or both. Provisions are also made for probation without verdict in cases of first offense simple possession.

Other sections of Article IV provide increased penalties for second and subsequent offenses, sales to minors, and continuing criminal enterprises.

The administrative and enforcement provisions of the bill are set out in Article V. These include sections on the powers of enforcement personnel, authorization for administrative inspections, injunctions, cooperative arrangements, confidentiality of medical records, forfeitures, and education and research.

Article VI provides for the necessary repealers and conforming amendments, severability clause, effective date, and other miscellaneous matters.

OCTOBER 6, 1971.

Dr. ROBERT L. DUPONT,
Director, Narcotics Treatment Administration, Washington, D.C.

DEAR BOB: The opening of two new drug treatment centers marks more significant improvement in the drug rehabilitation facilities within the District of Columbia.

In the 19 months since the Narcotics Treatment Administration was created, the number of heroin addicts in active treatment has increased from 150 to over 3,500. About three-quarters of all NTA patients come for treatment voluntarily referred by friends in the program. The remaining quarter are referred from agencies of the criminal justice system, including the landmark Superior Court urine surveillance program which tests all criminal suspects coming from the Court who may be drug abusers. NTA has published regular patient performance studies and is overseen by a prestigious Advisory Committee.

The Narcotics Treatment Administration program has become a National model for the rapid development of a large multi-modality heroin addiction treatment effort, NTA research into the dimensions and characteristics of the heroin addiction problem in Washington has been of national importance. The steps you have taken to institute a regional registry of addicts and to coordinate treatment programs in the Baltimore-District of Columbia corridor is an example for effective drug programming.

With the creation of the Special Action Office for Drug Abuse Prevention in the Executive Office of the President these early initiatives will be strengthened and your experience, gained in rapidly launching a large-scale multi-disciplinary treatment program, can be of unique value to other areas of the country. Moreover, in view of the clinical resources available at the NTA and throughout the Washington-Baltimore axis, the Special Action Office is developing a National Training Center in the Baltimore-Washington area.

I congratulate you on the fine job you have been doing with NTA and look forward to working closely with you in the future.

Sincerely,

JEROME H. JAFFE, M.D.,
Director.

By Mr. MATHIAS:

S. 2693. A bill to establish the Office of Youth Commissioner in the District of Columbia, to establish the Youth Commission, and for other purposes. Referred to the Committee on the District of Columbia.

THE DISTRICT OF COLUMBIA YOUTH ACT OF 1971

Mr. MATHIAS. Mr. President, in June, I introduced the Juvenile Delinquency Prevention and Rehabilitation Act of 1971 which amended the Omnibus Crime Control and Safe Streets Act of 1968 to provide for a comprehensive grant program for the prevention of juvenile delinquency and for the rehabilitation of juvenile delinquents. My bill, which is now pending in the Senate Judiciary Committee, is designed to create on the national level, programs of aid and assistance to States so that they might more effectively deal with the problems of juvenile delinquency prevention and rehabilitation.

Just as it is important to develop Federal programs of assistance to the States, it is just as ir portant for the States and localities to begin to develop their own programs of juvenile delinquency programing so that they will be ready to make good use of any Federal funds which become available for this purpose. Therefore, we must look very closely to our local problems and programs in juvenile delinquency prevention and rehabilitation of juvenile delinquents.

I have long been concerned with these problems, both in my own State of Maryland and in the District of Columbia. In fact, I recently held my own hearings on the problems of juvenile delinquency in Baltimore. In the District, I have grown increasingly alarmed over the problems caused by juvenile delinquency—both to the citizens of the District, and to the youthful offenders themselves.

Last June, the chairman of the District

of Columbia City Council, Gilbert Hahn, stated:

> Over 50% of today's crime in the District of Columbia is committed by those 18 years old and younger, and the percentage is apparently steadily rising . . . in the D.strict of Columbia we have at the moment no plan at all for dealing with juvenile delinquency—not even a bad plan.

It is for this reason that I am introducing a bill, the District of Columbia Youth Act of 1971, which I feel will provide a meaningful and long overdue plan for the prevention and control of juvenile delinquency in the District as well as establish a mechanism for helping those youths who have already, or who are, on the verge of becoming involved in juvenile delinquent behavior.

In 1966, The President's Commission on Crime in the District of Columbia recommended the establishment of a Youth Commission in the District to deal with the prevention of juvenile delinquency. This recommendation has not been implemented. Four years later, in October of last year, I directed a graduate student in the University of Maryland School of Social Work to investigate and report to me on juvenile delinquency prevention programs in the District. The study, which was done by Mrs. Barbara Hartman, who at the time was an intern in my office, was printed in the October 13, 1970, CONGRESSIONAL RECORD. The basic conclusions of that study indicated that the District programs in juvenile delinquency prevention were seriously lacking in evaluation, overall coordination of effort, and in the setting of objectives and goals. Nearly a year later, the situation has not substantially changed.

The District government has taken steps—through its reorganization program—to pull together various programs and attempt to coordinate efforts in the area of youth programing. However, I believe that—overall—much more can and must be done if youths in the District are to be afforded a broad, meaningful and high level program in juvenile delinquency prevention.

Something must be done now. It has already been nearly 6 years since the Crime Commission report and I do not believe that we can continue to delay the implementation and establishment of a high level central office and mechanism in the District government to combat juvenile delinquency.

I believe that my bill will not only provide a meaningful and useful plan for dealing with the many aspects of juvenile delinquency in the District, but it will also bring top priority attention to this problem as well as provide for the involvement of youths themselves in the planning, reviewing and policymaking stages of programs designed to benefit them.

It is the intent of my bill to help guarantee that the youths of this city have a concerted, high level, and coordinated effort in juvenile delinquency prevention and control programing so that such programs can best serve the needs, not only of the youths themselves, but also of the entire Washington metropolitan area. Juveniles are the hope and future of any city, and if we fail to plan and design meaningful programs to help them now, then we also fail to provide for our own futures.

It is also the intent of my bill to better assist the youths of this city to stay out of the criminal justice system and to help them and rehabilitate them in the best and most comprehensive manner possible once they have already been involved in delinquent behavior. In the implementation of the provisions of this bill, it is my intent that the emphasis should and must be on the prevention of juvenile delinquency before it occurs, and on rehabilitation and treatment of the juvenile offender once such conduct or behavior has occurred.

Finally, I wish to point out and stress that my bill is in no way an attempt to assume the responsibilities of the District government in this area, nor in any way meant to undercut the concept of home rule which I support, or the authority of the District to reorganize the government. In fact, it is designed to help the District in its efforts to develop juvenile delinquency prevention and rehabilitation programs. It merely gives the District a mechanism—a mechanism which was endorsed and recommended in concept by the Crime Commission—to carry out its programs in a manner which I feel is most necessary if the city's goals in this area are to be realized.

I ask unanimous consent to have printed in the RECORD an outline of my bill.

There being no objection, the outline was ordered to be printed in the RECORD, as follows:

OUTLINE OF SENATOR MATHIAS' "DISTRICT OF COLUMBIA YOUTH ACT OF 1971"

I. YOUTH COMMISSION

Section 201 of the bill creates a District of Columbia Youth Commission which is designated as the advisory and review body in the District for all Federal and District Government Programs relating and pertaining to the prevention and control of juvenile delinquency and the rehabilitation of juvenile offenders.

The Commission's functions include the consideration, review and, where necessary, the revision, of any budget estimates submitted to it by the Youth Commissioner pursuant to other provisions of the bill. The Commission is to consult with and advise the Youth Commissioner on matters related to juvenile delinquency prevention and control as well as any reports and data which the Youth Commissioner submits to it.

The Commission is to be composed of eleven members as follows:

(a) Seven persons, appointed by the Mayor, who are well qualified or experienced in juvenile delinquency programming, at least TWO of whom must be representatives or members of community or neighborhood organizations in the District, and at least TWO of whom must be members or representatives of private agencies engaged in programs related to juvenile delinquency prevention, control or rehabilitation of juvenile offenders in the District;

(b) One member appointed by the Mayor who shall be a Student attending a Senior high school in the District;

(c) One member, appointed by the Mayor, who shall be a Student attending a Junior high school in the District;

(d) One member who shall be a former inmate of the Lorton Reformatory on parole or probation, appointed by the Mayor with the recommendation of the Superintendent of the Department of Corrections; and

(e) One member who shall be a resident of a juvenile correction facility serving the District, appointed by the Mayor on the basis of a recommendation from the head of such a facility;

II. YOUTH COMMISSIONER

Section 202 of the bill creates the Office of Youth Commissioner of the District, to be headed by a Youth Commissioner appointed by the Mayor with the advice and consent of the City Council.

The bill provides the Youth Commissioner with very broad powers, duties, and responsibilities including:

(a) Planning, developing and implementing a comprehensive program in the area of juvenile delinquency prevention, control and rehabilitation of juvenile offenders in the District.

(b) Coordinating, evaluating and reviewing programs which have delinquency implications, including those programs for the emotionally disturbed and mentally ill adolescent, and coordinating the activities and programs of public and private agencies in the area of juvenile delinquency so that they are operated more effectively to eliminate duplication of services, and so that such programs conform to the overall city plan formulated by the Commissioner;

(c) Reviewing and approving all funding proposals to the Federal Government by private agencies in the area of juvenile delinquency prevention and control and rehabilitation of juvenile offenders, and preparing spending proposals and applications to the Federal Government for such public programs.

(d) Working closely with the Director of the Narcotics Treatment Administration to coordinate programs and efforts in the treatment and rehabilitation of juveniles in the area of drug abuse and drug addiction prevention;

(e) Establishing a mechanized informational system where pertinent data and information on the scope and depth of juvenile delinquency programming, occurrence of juvenile delinquency and other relevant information which may be kept for the improvement of current programs and development of new concepts and programs in the area of delinquency prevention and control; and in the treatment and rehabilitation of juvenile offenders, and

(f) requesting reports from and working with other city agencies and agency heads in the development and implementation of the programs pursuant to the bill.

Concerning the informational system and data center established under the bill, Section 202(c)(2) directs the Chief Judge of the Superior Court of the District of Columbia to appoint a Committee of lawyers to advise and make recommendations in connection with the planning and implementation of the information system so that there will be a maximum degree of privacy and protection of juveniles' rights under the informational system. The lawyers' committee, after establishing such standards and safeguards as deemed necessary, shall report its recommendations to the Chief Judge who in turn will give the committee's recommendations to the Youth Commissioner for implementation. The Executive Officer and the Director of Social Services of the Superior Court are directed to work with and advise the lawyers' committee.

III. YOUTH COMMISSIONER'S ADVISORY BOARD

Section 204 of the bill establishes a Youth Commissioner's Advisory Board composed of major city officials or their designees to work with and advise the Youth Commissioner on the implementation of the bill as well as provide him with reports or other data which he requests for the purposes of carrying out his duties and responsibilities under the bill.

IV. TRANSFER OF FUNCTIONS—POWERS

Because of the necessity for overall and central coordination, planning and implementation of a comprehensive program, Section 205 of the bill transfers the following

functions, powers and duties to the Office of Youth Commissioner 120 days after the enactment of the legislation:

a. The Bureau of Youth Services of the Social Service Administration including the facilities at Maple Glen, Cedar Knoll, the Oak Hill Youth Center, the Receiving Home for Children, and Youth Group Homes;

b. The Office of Youth Opportunity Services; and

c. The functions, powers, and duties of the Department of Recreation that relate specifically to the prevention of juvenile delinquency, including the Roving Leaders Program, and such other programs as the Mayor and Youth Commissioner determine necessary in order to carry out the duties of the bill.

By Mr. BENTSEN (for himself and Mr. TOWER):

S. 2694. A bill to designate the Veterans' Administration hospital in San Antonio, Tex., as the Audie L. Murphy Memorial Veterans' Hospital. Referred to the Committee on Veterans' Affairs.

Mr. BENTSEN. Mr. President, I am today introducing legislation to designate the Veterans' Administration hospital presently under construction in San Antonio, Tex., as the Audie L. Murphy Memorial Veterans' Hospital. The entire Texas congressional delegation is cosponsoring this bill which honors the bravery and patriotism of an outstanding young Texan in distinguished service to his country during World War II. Audie L. Murphy was the most decorated veteran of that war, but perhaps his most important contributions were the courage, the self-sacrifice, and the devotion to his country which underlay his gallant actions.

This hospital, which will serve the medical needs of thousands of veterans in the future, is dedicated to the spirit of Audie L. Murphy and many like him who set aside their own personal safety and risked their lives for this Nation. In a time when patriotism and courage are neither popular words nor valued concepts, the designation of this modern medical facility as the Audie L. Murphy Memorial Veterans' Hospital will evoke the spirit not only of these valiant defenders of our Nation's freedoms but also the spirit of gallantry and love of country which, I am convinced, still characterize the American people.

By Mr. BYRD of West Virginia (for Mr. JACKSON, for himself and in behalf of Mr. ALLOTT) (by request):

S. 2695. A bill to provide for the division of assets between the Twentynine Palms Band and the Cabazon Band of Mission Indians, California, including certain funds in the U.S. Treasury, and for other purposes. Referred to the Committee on Interior and Insular Affairs.

Mr. BYRD of West Virginia. Mr. President, at the request of and on behalf of the distinguished junior Senator from Washington (Mr. JACKSON), I introduce a bill to provide for the division of assets between the Twentynine Palms Band and the Cabazon Band of Missions Indians of California, including certain funds in the U.S. Treasury, and for other purposes. I ask unanimous consent to have printed in the RECORD a statement by Mr. JACKSON with respect to the bill. I also ask unanimous consent that there be printed in the RECORD a statement by the Assistant Secretary of the Interior, together with a draft of the proposed bill.

There being no objection, the items were ordered to be printed in the RECORD, as follows:

STATEMENT BY SENATOR JACKSON

I send to the desk for appropriate reference a bill to provide for the division of assets between the Twentynine Palms Band and the Cabazon Band of Mission Indians, California, including certain funds in the U.S. Treasury, and for other purposes.

This legislation was submitted and recommended by the Department of the Interior.

U.S. DEPARTMENT OF THE INTERIOR,
Washington, D.C., August 6, 1971.

Hon. SPIRO T. AGNEW,
President, U.S. Senate,
Washington, D.C.

DEAR MR. PRESIDENT: Enclosed is a draft of a proposed bill "To provide for the division of assets between the Twenty-Nine Palms Band and the Cabazon Band of Mission Indians, including certain funds in the United States Treasury, and for other purposes."

We recommend that the proposed bill be referred to the appropriate committee for consideration and that it be enacted.

Under this legislation the Secretary of the Interior is authorized and directed to issue a trust patent for 240 acres of land, more or less, that will be held by the United States in trust for the Twenty-Nine Palms Band of Mission Indians. The bill also provides that $2,825, plus interest, in the tribal fund of the Cabazon Band will be transferred to the tribal fund of the Twenty-Nine Palms Band of Mission Indians.

The need for this legislation has been brought about by the following circumstances. Under authority of the Act of January 12, 1891 (26 Stat. 712), trust patent 134436 was issued on June 6, 1910, to the Cabazon and Twenty-Nine Palms Band of Mission Indians for 640.48 acres of land of which the 240 acres described in this proposed bill are a part. The effect was to make the two bands tenants in common; each receiving an undivided one-half interest in the land subject to the terms of the patent. During the two allotment programs carried out on the Cabazon Reservation, ten 40-acre parcels were allotted in Section 30, T. 5 S., R. 8 E., San Bernardino base and meridian. Although these allotments were made to Cabazon Indians, two of them were actually Twenty-Nine Palms Indians who qualified under the regulations and were enrolled as members of the Cabazon Band.

A peculiar relationship exists between the Cabazon and Twenty-Nine Palms Bands. It began in 1908 when this Bureau authorized the transfer of 15 Chemehuevi Indians from the Twenty-Nine Palms Reservation to Section 30, T. 5 S., R. 8 E., San Bernardino base and meridian, which was adjacent to the Cabazon Reservation. At the time the patent was issued in 1910 to the two bands, only two elderly Twenty-Nine Palms Indians remained on the Twenty-Nine Palms Reservation and they died shortly thereafter. Since that time the Twenty-Nine Palms Reservation to our knowledge has not been occupied.

There are, however, Twenty-Nine Palms Indians, and a number of them have been consistently recognized as members of the Cabazon Band. Their names have been carried on the official Cabazon census records; they have intermarried with Cabazon members, lived on Cabazon lands, participated in tribal affairs and shared in the use of tribal assets and resources. Pursuant to the provisions of Section 5 of the Act of August 25, 1950 (64 Stat. 471), regulations were promulgated for the enrollment of Indians of the Cabazon Band of Mission Indians and appear in 25 CFR 43. Paragraph 43.5(d) provides for the enrollment of Indians who have one-quarter or more degree of Indian blood and can establish that they have been affiliated with the Band for a period of one year or more preceding June 30, 1949, and it sets up certain other criteria. Under this provision, several Indians previously considered as Twenty-Nine Palms Band of Mission Indians have been enrolled as Cabazon Indians and no Indian has been denied enrollment purely on the basis that he was a Twenty-Nine Palms Indian.

A membership roll of the Twenty-Nine Palms Band of Mission Indians dated July 15, 1969, lists 13 persons, nine of whom are over 21 years of age. Six of these are heads of families. All nine have been contacted and have consented in writing to the division of Section 30 and to accept the full amount received as damages from the right-of-way granted over this section.

The Cabazon Band by resolution adopted May 6, 1962, relinquished all right, title and interest in the remaining tribal lands in Section 30 comprising some 240 acres plus $2,825 and interest. This action was reaffirmed by a resolution enacted on February 7 of this year at which time the tribal council requested that action be taken to divide the assets. The sum of $2,825 represents one-half of the amount collected as payment of a storm channel right-of-way granted across unallotted lands in 1960. Although the entire sum of $5,650 was initially deposited in the United States Treasury to the credit of the Cabazon Band, it was later adjusted by transfer of $2,825, plus interest earned on that amount while in the Cabazon fund, to the tribal trust fund of the Twenty-Nine Palms Band. With enactment of this legislation the unallotted land in Section 30 and the remaining funds from the right-of-way would be transferred to the Twenty-Nine Palms Band of Indians.

The Whitewater River storm channel and highway 60–70 traverse this 240 acres in such a manner as to divide the property into three separate parcels. One parcel of 92 acres is considered agricultural land with a value of $51,752. Another parcel of 23 acres is considered to have a good commercial potential with an interim use for limited agriculture. Irrigation water is available. It has a fair market value of $34,680. The third parcel of 64 acres also has irrigation water available. It is agricultural property with an industrial potential and has a value of $64,030. This makes a total value of $150,462 for the 240 acres.

We believe this legislation will result in an equitable division of Section 30, bearing in mind the past history and present status of the bands and the continuing desire of members of each band to have this action taken. Furthermore, it is our belief this legislation would have no effect on termination of the reservation at some future time, if the band so desired, under authority of the Act of August 18, 1958 (72 Stat. 619), as amended by the Act of August 11, 1964 (78 Stat. 390).

The Office of Management and Budget has advised there is no objection to the presentation of this proposed legislation from the standpoint of the Administration's program.

Sincerely yours,

HARRISON LOESCH,
Assistant Secretary of the Interior.

S. 2694

A bill to provide for the division of assets between the Twenty-Nine Palms Band and the Cabazon Band of Mission Indians, California, including certain funds in the United States Treasury, and for other purposes

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

Secretary of the Interior, acting for and on behalf of the United States and the Cabazon Band, is hereby authorized and directed to convey to the Twenty-Nine Palms Band of Mission Indians the beneficial interest in the NE ¼, NE ¼ NW ¼ and NE ¼ SE ¼ Sec. 30, T. 5 S., R. 8 E., San Bernardino base and meridian, California, comprising 240 acres, more or less, as shown on Bureau of Land Management plat of survey approved July 30, 1927.

SEC. 2. The conveyance authorized by this Act shall be by trust patent and title shall be held by the United States in trust for the Twenty-Nine Palms Band of Mission Indians, *Provided however*, That said trust patent shall not operate to extend the period of trust as specified in the original patent.

SEC. 3. The Secretary of the Interior is authorized and directed to distribute from the tribal fund of the Cabazon Band of Mission Indians to the tribal fund of the Twenty-Nine Palms Band of Mission Indians the amount of $2,825, plus interest earned on that amount.

By Mr. PROXMIRE (for himself, Mr. CANNON, Mr. HARRIS, Mr. HARTKE, Mr. HUGHES, Mr. KENNEDY, Mr. MANSFIELD, Mr. MCGOVERN, Mr. METCALF, Mr. PELL, Mr. PERCY, and Mr. MOSS):

S. 2696. A bill to provide a program of pollution control in the river basins and waterways of the United States through comprehensive planning and financial assistance to municipalities and regional water basin management associations for the construction of waste treatment facilities. Referred to the Committee on Public Works.

THE REGIONAL WATER QUALITY ACT

Mr. PROXMIRE. Mr. President, I am introducing today the first part of a three-part comprehensive program to cope with our environmental problems. The program is an incentive for a cleaner environment—for clean water, clean land, and clean air. The first prong of this all-out attack is legislation to provide an incentive for clean water, the Regional Water Quality Act. Within the next few months. I intend to offer similar proposals for combating air pollution and solid waste pollution.

The Regional Water Quality Act was originally introduced as S. 3181 in the 91st Congress. I offered this bill after the U.S. General Accounting Office issued a comprehensive report on the state of the Nation's progress in fighting water pollution—a report entitled, "Examination Into the Effectiveness of the Construction Grant Program for Abating, Controlling and Preventing Water Pollution"—November 3, 1969. The report was very discouraging, indeed. It concluded that despite the expenditure of over $5.4 billion by governmental sources between 1957 and 1969, the quality of the Nation's waters had not improved. In fact, the report found that we had been losing ground.

Mr. President, it is now 2 years later. But there is no evidence that the water is any cleaner. This is amply demonstrated in the annual report issued in August by the Council on Environmental Quality.

The council, based on data supplied by the Environmental Protection Agency, found that less than 10 percent of the Nation's stream miles could be classified as "unpolluted" or "moderately polluted." That means 90 percent were polluted. It found more than one-third of the Nation's stream miles to be "characteristically polluted," in that they consistently violate Federal water quality criteria.

INDUSTRY: MAJOR SOURCE OF WATER POLLUTION

The council noted that industrial wastes constitute the largest source of organic water pollution in the Nation—CEQ Report 218. This was principally comprised of biochemical oxygen demand (BOD). BOD represents the consumption of a waterway's oxygen content—oxygen which is essential to a stream's capacity to assimilate and break down organic wastes.

According to the Council on Environmental Quality, the BOD content of waste discharged by all U.S. manufacturing facilities is four to five times larger than the BOD discharged by the entire population of the United States. During the years 1964 to 1968, annual BOD discharges from industrial sources increased by 7.2 billion pounds.

In 1970, industry used 10 times the amount of water used by municipal systems, and the ratio is still rising. Industrial pollution is also generally more toxic than municipal pollution. Heavy metals such as mercury, cadmium, and arsenic come almost exclusively from industrial sources.

INDUSTRY CAPABLE OF ABATEMENT

Is industry capable of making the expenditures we are asking it to make in order to abate pollution? The answer is clearly yes, as the chart below will demonstrate.

The chart indicates that, on the average, water pollution abatement generally costs less than 1 percent of total industrial output. For example, this varies from 0.2 percent for the transportation industry, to 0.4 percent for textiles, to 0.5 percent for petroleum, to 0.9 percent for primary metals, on up to 1.6 percent for the paper industry. I ask unanimous consent that the complete chart—from CEQ annual report, page 123—be printed in the RECORD at this point.

There being no objection, the table was ordered to be printed in the RECORD, as follows:

TABLE 6.—IMPACT OF WASTE WATER TREATMENT COSTS ON SELECTED INDUSTRIES, 1974

[Dollars in millions]

Industry	1967 value of shipments	Total annual control costs	5-percent increase in wages	Control costs as percent of 1967 value of shipments	5-percent increase in wages as percent of 1967 value of shipments
Food and kindred products	$84,062	$260	$506	0.3	0.6
Textiles	19,733	80	218	.4	1.1
Paper	20,740	326	221	1.6	1.1
Chemicals	42,470	421	325	1.0	.8
Petroleum	22,042	110	61	.5	.3
Rubber and plastics	12,789	24	165	.2	1.3
Primary metals	46,550	396	492	.9	1.1
Machinery, excluding electrical	48,357	42	708	.1	1.5
Transportation equipment	68,238	115	752	.2	1.1

Source: Based on U.S. Department of Commerce, Bureau of the Census, and Environmental Protection Agency data.

Mr. PROXMIRE. The above chart, by the way, probably overstates the percentages considerably, because the annualized pollution control costs were based on 1974 figures, while the industrial output data is based on 1967 figures.

Hence, industry quite clearly is capable of abating its pollution.

EXISTING LAW NOT WORKING

Then, why is existing law not bringing about the needed abatement? How is existing law inadequate, and can we improve on the present regulatory approach?

Standard-setting and enforcement are the two basic elements of the present regulatory law. The law stipulates that the Environmental Protection Agency, working with the States, sets standards for uses of the Nation's waterways. The law then spells out elaborate enforcement machinery to compel recalcitrant dischargers to abate their pollution.

There are substantial problems with both ends of the scheme.

PROBLEMS WITH STANDARDS

Basically, the standards approach requires all polluters on a stretch of a stream covered by the standards to cut back their pollution by an equiproportional amount until the standards are met. This may equalize the cutback in waste loads, but it is far from an equalization of waste costs. Hence, while the standards approach sounds equitable at first glance, it is really rather inequitable. Moreover, it is also extremely inefficient.

The reason is that the cost of abating a given unit of discharge may vary enormously from one outfall to another. Some plants may be able to cut back a substantial percentage of the discharge at relatively low cost, while others may find it extremely costly to eliminate even

a small percentage of their discharges. Requiring an equal percentage cutback for all plants, then, would impose an enormous financial burden on some plants, and very little on others. This is what makes enforcement so difficult—the plant with very high waste treatment costs resists enforcement to its utmost, while the plant with very low treatment costs simply complies, and the sum total of all cutbacks falls far short of what is required to meet the standards.

This was put very well in a recent article in the Harvard Law Review by Prof. Marc Roberts, entitled "River Basin Authorities: A National Solution to Water Pollution."

> Any rule that requires all plants to cut back their pollution by a specified percentage or to provide a specified level of treatment is bound to be very inefficient. It will produce lower water quality for any given expenditure level, or else it will cost more than necessary to attain some target level of abatement. Under this type of system, which is essentially the approach now being tried in this country, some plants will be asked to spend large amounts of money for small or negligible increases in the usefulness of the stream, while others will not be forced to treat their waste to the desirable level. Such inefficiencies are inherent in the use of simple rule-based regulation to improve stream quality. (83 *Harvard Law Review* 1527, 1543)

The Council on Environmental Quality concurs in this conclusion. In its annual report, the Council concluded that despite the air of equity about it, the equiproportionate scheme is inefficient and expensive—CEQ report, 136.

In addition, the standards provide no continuing incentive for water polluters to cut back on their waste. Once the demands of the law are satisfied, water polluters can continue to dump undesirable waste into the waterways, as long as the standards are not violated. There is no incentive whatsoever to improve the quality of the water beyond the standards.

Finally, the standards approach does not solve the problem of inadequate revenue. EPA estimates that the Nation's water quality needs will cost $38 billion for the period 1970 to 1975. Where is this money to come from? If we continue to rely solely on the standards approach, our already overburdened Federal, State, and local budgets must bear the major brunt of this.

We all know how difficult it is to secure authorization for these programs, and after that the appropriation has to cut back the amount authorized, and then after that the President often withholds the amount appropriated. For this reason, it is extraordinarily hard to get the amount of money which the EPA estimates.

PROBLEMS WITH ENFORCEMENT

There are as many problems with the present enforcement scheme as there are with the standards. The enforcement process entails identifying violators, calling an enforcement conference, and litigation in the courts to back up the conference. The process is extremely drawn out—one case took 15 years to settle—and is extremely haphazard as well.

In almost every case, it pays for a potential violator to contest the enforcement rather than abate his pollution. Even if the enforcement is ultimately successful, the annual expenses of fighting the enforcement may well turn out to be less than the cost of pollution abatement. And with such a cumbersome procedure the Federal Government can hardly afford to initiate enforcement proceedings against more than a handful of violators. The result is that the chance of any given polluter being targeted for enforcement is so random, and the chance of the enforcement process being pursued to the ultimate conclusion so small, that the threat of enforcement constitutes virtually no threat at all. Most of the violators will go scot free, and they know it.

Now listen to this: As one indication of this, the Library of Congress reports that over the last 14 years, only 50 separate actions have been taken against recalcitrant polluters. According to the Library's study:

> Many of the enforcement conferences have been reconvened, some as many as five times.

Only four of the actions have proceeded as far as the public hearing stage, and in only one instance was court action taken.

The CEQ, in its annual report, acknowledged that present enforcement mechanisms are limited and cumbersome. Clearly, as long as we rely solely on such enforcement mechanisms, few polluters are going to be induced to control pollution by the fear of enforcement.

A NEW STRATEGY IS NEEDED

Mr. President, what is needed is an additional tool to prod industry into abating its pollution. If prodded, it's clear that industry is capable of making the expenditures necessary to achieve abatement, as I've indicated earlier.

The Regional Water Quality Act would give industry the incentive which present law lacks to spend the money it should on water pollution control. My bill would do this by imposing effluent charges on industrial water polluters in direct proportion to the amount of waste discharged. Each polluter would thus be made financially responsible for his own pollution. And the charge will be set at a level which would make it cheaper to abate pollution than to pay the fee.

The bill specifies that the charge to be levied on BOD discharges shall not be less than 10 cents a pound. At this level, it is estimated that the charge would generate about $1½ billion in its first year of operation.

The other key element of my bill is that the money collected by the Federal Government would go into a fund which would be available for both municipalities and regional water management associations.

Virtually every water quality expert that I know of believes it is essential that each river basin have its own water authority, with full enforcement power over all discharges. The effluent charge will help bring this about.

POWERS OF THE RIVER BASIN AUTHORITY

The powers that a regional authority should have were laid out in an article entitled "Strategies for Environmental Management" by Allen V. Kneese, appearing in the winter 1971 issue of Public Policy. Among the activities which such agencies would have jurisdiction over are:

Production process charges, such as recycling, byproducts recovery, or waste water reuse;

Construction and operation of individual waste treatment facilities;

Discharge of effluent residuals into the stream at points of high assimilative capacity;

Collective treatment of residuals, where economies of scale operate; and

Augmentation o fthe streams' assimilative capacity through aeration, oxidation, or regulation of streamflow.

Agencies which meet these criteria and are prepared to exercise such powers in a designated river basin would be eligible to receive grants from the effluent charge fund. Once in operation, the regional management association would take over administration of the effluent charge, and be empowered to levy charges above, but not below, the Federal effluent charge on BOD discharges. The agencies would also have the power to levy charges on discharges other than BOD—such as suspended solids, thermal discharges, toxic discharges, and so forth. The agency would have jurisdiction over all discharges into the river basin, municipal as well as industrial.

ADVANTAGES

Mr. President, the effluent charge approach has a number of significant advantages over the existing system alone.

First, effluent charges provide industry with a powerful financial incentive to abate pollution at the source. The profit advantage, which has been missing up until now, would be supplied by this bill. "Pay or stop polluting" is a language industry understands. The effluent charge, as long as it is set higher than the cost of abatement, would be virtually certain to induce the type of action we want industry to take.

Second, it is fair and equitable. The Federal taxpayer shouldn't have to pay to clean up industrial pollution. The one to pay should be the one who does the polluting in the first place.

Third, industry will undoubtedly pass on a portion of the effluent charges to the consumer. This is not a drawback but an advantage. Products which entail high polluting production processes will go up in price relative to products with low pollution discharges. As a result, the marketplace will favor the latter, and demand for high-polluting products will lessen. Thus, by using effluent charges, the forces of the marketplace can help us achieve desirable social ends.

Fourth, the incentive would be a continuing one. It would operate even after stream standards are met, and continue to induce pollution abatement as long as it costs less to abate the discharge than to pollute. In areas where virtually no discharge at all can be tolerated, the regional management association can bring this about by increasing the charge exponentially.

Fifth, this bill would ease considerably the burden on the Federal budget. In contrast to existing proposals, which would cost from $12 billion to $14 bil-

lion over the next 5 years, it is estimated that this bill would cost $4.3 billion. This would include a grant program as large as that in the other bills—see testimony of Robert Haveman, professor of economics at the University of Wisconsin, before the Joint Economic Committee, June 4, 1971. Needless to say, this would substantially alleviate the burden on the already overburdened Federal budget.

Sixth, it would provide desperately needed help for the cities, in addition to inducing the formation of regional river basin authorities. Despite the substantial increase in grant authorizations in recent years, we are still far short of the money needed by municipalities for waste treatment works. The effluent charge fund would be available to help satisfy those needs.

Seventh, effluent charges, if administered by regional river basin authorities, could help induce advance reporting of unusually heavy discharges. Edwin L. Johnson, in an article in Water Resources Research entitled "Further Study in the Economics of Water Quality Management," makes the point that if dischargers can be induced to report in advance, the agency may be able to head off the effects of the discharge by requesting increased treatment, augmenting the flow of the river, diverting the waste to corrective facilities, or taking other preventive steps. Without such advance reporting, the agency would levy the effluent charge, of course, but the undesirable result is that the agency would "end up with a large sum of money and lots of dead fish."—Johnson, page 301.

Eighth, effluent charges provide industry with the flexibility to determine how best to abate pollution. In their book, "Managing Water Quality: Economics, Technology, Institutions," Allen Kneese and Blair Bower point out that industry could choose from a number of alternatives, in addition to construction of waste treatment facilities, in abating its pollution:

> The effluent charges procedure would have the advantage over other possible techniques of permitting each waste discharger to adjust in the most efficient way for his particular circumstances. Individual dischargers could withhold waste in temporary storage, adjust production processes, change raw materials, treat wastes, cut back on production, change the character of their output, pay the charge, or use a combination of these procedures. (Page 133.)

Often this can have beneficial side effects. For example, the St. Regis Paper Co., in pioneering a closed system for water recycling, developed a procedure for converting black liquor, which is normally a harmful waste byproduct of paper production, into activated carbon. The activated carbon is then used to filter waste out of the papermill's waste effluent. Having treated the water in this fashion, it is then clean enough to be reused and recycled by the mill.

Finally, and perhaps most significant, effluent charges work. In localities in this country where the system has been tried, it has worked dramatically well. Charges have been instituted at the municipal level in communities in Michigan, in Missouri, in Ohio, and in each case where the system has been tried there has been an immediate and very substantial reduction in water pollution.

A charge system has been in effect for decades in the Ruhr Valley, in Germany. This is one of the most industrialized areas in the world, and yet the system of charges there has maintained a remarkably high level of water quality throughout the region.

In addition, a new law establishing effluent charges tied in with the permit system has just gone into effect in the State of Vermont. It is still too early to tell what the experience of that law will be.

Mr. President, the bill we are introducing today specifies an effluent charge on BOD discharges of 10 cents per pound. This level was suggested by Allen Kneese in his book on water quality, and is also the level recommended following a study by the Federal Water Pollution Control Administration of the Delaware River.

The FWPCA study was done in 1966, and its conclusions were:

First. Effluent charges should be seriously considered as a method of maintaining water quality improvement.

Second. Cost of waste treatment induced by a charge level will approach the least costly treatment plan.

Third. A charge level of 8 to 10 cents per pound of oxygen demanding material discharged appears to produce relatively high increases in critical dissolved oxygen levels.

Fourth. Major regional economic readjustments from a charge of that level are not anticipated to occur in the study area.

Fifth. Administrative costs and difficulties of managing an effluent charge method are greater than conventional methods of quality improvement. However, the problems are not insurmountable and are not sufficiently great to negate the advantages of the charge method.

Sixth. Compared with the conventional method of improving water quality, the charge method obtains the same goal at lower costs of treatment, with a more equitable impact on polluters. Also, the charge provides a continuing incentive for the polluter to reduce his waste discharge and provides a guide to public investment decisions.

Seventh. More study is needed of the technical problems of coping with differential charges related to waste load discharge durations, to prediction of induced responses, administrative problems associated with sampling of dischargers, and damage estimation.

This is not to say that the charge of 10 cents per pound of BOD is all that a polluter will have to pay. The regional water basin association would have the power to add to the charge in instances where virtually no BOD discharges could be tolerated. However, in no event could the management association levy a charge of less than 10 cents per pound of BOD. The association would also have the power to levy charges on other discharges, such as suspended solids, toxins, and thermal discharges—the charges for which we do not spell out in the bill.

SUPPLEMENTS, NOT SUPPLANTS, EXISTING LAW

Mr. President, the legislation we are introducing today is designed to supplement existing legislation, not supplant it. The Refuse Act permit program, for example, is a useful tool for providing the information that would be needed to determine charge schemes. And the effluent charge, in turn, should greatly help enforce laws now on the books. In addition, in levying charges on discharges other than BOD, the river basin associations may be guided by the standards which have been established pursuant to the Water Quality Act of 1965 and the Clean Water Restoration Act of 1966.

THE OTHER "INCENTIVE" ALTERNATIVE

Mr. President, another alternative to existing law that has been frequently put forward is giving tax breaks to industries that install waste treatment facilities. Industry would be allowed an accelerated depreciation for the cost of constructing such facilities, or a direct tax credit for part of the cost of construction. It is said this would also give industry an incentive to abate pollution at the source.

These proposals were most recently advanced by a representative of the National Association of Manufacturers in testimony before the Joint Economic Committee this July.

However, there are a number of serious defects with the tax write-off approach. For one thing, tax writeoffs for new facilities create an incentive for treatment works only. There is no incentive—indeed there is a disincentive—to use other types of abatement methods, such as production process changes, reuse of waste water, production by-product recovery, storage of wastes, and the like. In fact, credits and write-offs might induce industry to adopt a very inefficient means of waste abatement when other means might be far more effective and less costly overall.

In addition, accelerated depreciation or tax credits really provide no net incentive at all. It would still cost industry a substantial amount of money to install such facilities, only part of which would be written off against taxes. Accordingly, tax writeoffs would not be likely to induce as much waste treatment as we need unless it is also combined with a broad and effective enforcement policy. This once again gets back to the very serious difficulties in the present enforcement system.

Moreover, writeoffs and credits have the effect of reducing Federal revenue at a time when such revenues are desperately needed. We have no way of predicting just how extensive the industry response might be, and the loss of revenues might be very substantial indeed. Effluent charges of course, would have just the opposite effect.

Finally, the tax incentive would have little or no impact at all on marginal firms, which are already paying little or no tax. These marginal firms are often the worst polluters of all. Thus, tax incentives might have the effect of inducing pollution abatement by industries that are not polluting too much at all, and not inducing abatement where it is most needed.

NEW SUPPORT FOR EFFLUENT CHARGES

Mr. President, when I introduced this legislation originally 2 years ago, a number of conservation and environmental spokesmen expressed doubts about this approach. I am gratified to say that most of these organizations now support the concept of pollution taxes as an effective means of inducing abatement. At hearings before our Joint Economic Committee in July, representatives of the Sierra Club, the National Wildlife Federation, Friends of the Earth, and the Audubon Society testified in behalf of a pollution tax strategy. This is a most welcome and encouraging development.

I am also very encouraged by recent indications that the administration may be favorably disposed toward this approach. In its annual report issued this summer, the President's Council on Environmental Quality acknowledges that a well constructed charge system "would quickly curb waste discharges," and that by using the charge system in conjunction with the existing regulatory approach we could "achieve environmental standards faster and cheaper." This is also an extremely gratifying development, and I hope that it presages favorable action on the legislation I am introducing today.

Mr. President, I introduce the bill in behalf of myself, the Senator from Nevada (Mr. CANNON), the Senator from Oklahoma (Mr. HARRIS), the Senator from Indiana (Mr. HARTKE), the Senator from Iowa (Mr. HUGHES), the Senator from Massachusetts (Mr. KENNEDY), the Senator from Montana (Mr. MANSFIELD), the Senator from South Dakota (Mr. MCGOVERN), the Senator from Montana (Mr. METCALF), the Senator from Utah (Mr. MOSS), the Senator from Rhode Island (Mr. PELL), and the Senator from Illinois (Mr. PERCY). I ask that the bill be appropriately referred and that it be printed in the RECORD at this point.

There being no objection, the bill was ordered to be printed in the RECORD, as follows:

S. 2696

A bill to provide a program of pollution control in the river basins and waterways of the United States through comprehensive planning and financial assistance to municipalities and regional water basin management associations for the construction of waste treatment facilities

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

SHORT TITLE

SECTION 1. This Act may be cited as the "Regional Water Quality Act of 1971".

FINDINGS AND PURPOSE

SEC. 2. (a) Congress finds and declares that the clear, fresh, natural waters of the Nation's rivers, lakes, streams, estuaries, bays, and coastal areas have become despoiled and unsightly dumping grounds for the wastes of our industries and for the raw or inadequately treated sewage of our communities; that there is a national concern for the potentially harmful effects of these waters to our health and welfare, for the esthetic qualities of these waters, and for the suitability of these waters for municipal, agricultural, industrial, recreational and wildlife, and sport and commercial fish uses; that there is a national urgency to control, prevent, and eliminate polluting substances in these waters through the construction, where appropriate, of coordinated river basin or areawide waste treatment works if these waters are to be reclaimed and restored to adequate standards of quality for our health, welfare, and resource needs; that present Federal programs now authorized to provide financial assistance in the construction of such works are inadequate to meet the rising demand for the works and that these programs have focused on the need for individual municipalities to construct treatment facilities rather than on coordinated efforts to clean up entire river basins and attack all major sources of pollution; that these present programs need to be supplemented by a program which focuses on a coordinated regional approach which provides desirable economic incentives to water users to conserve water and to minimize pollution through reduction in the quantity of waste products dumped into these waterways and which will encourage the formation of interstate regional water basin management associations which ultimately will assume full financial responsibility for the provision of waste treatment works in the most effective and economically efficient manner.

(b) It is therefore the purpose of this Act to encourage the formation of permanent regional water basin management associations which are responsible for the prepartion and development of comprehensive pollution control plans for a river basin or a part thereof or other area that is consistent with or part of a comprehensive river basin water and related land use plan for the area. These objectives shall be accomplished through—

(1) the establishment of economic incentives to water users to conserve water and minimize wastes and to join together in regional water basin management associations to promote the most efficient use of the water sources of the region; and

(2) the provision of financial assistance to municipalities and regional water basin management associations for the construction of waste treatment facilities.

DEFINITIONS

SEC. 3. For the purposes of this Act the term—

(1) "Administrator" means the Administrator of the Environmental Protection Agency;

(2) "regional water basin management association" means a State or interstate agency responsible for developing and carrying out a comprehensive water pollution control program for a river basin or a part thereof or other area which is consistent with or part of a comprehensive river basin water and related land use plan;

(3) "construction" includes preliminary planning to determine the economic and engineering feasibility of waste treatment activities, the engineering, architectural, legal, fiscal, and economic investigations and studies, surveys, designs, plans, working drawings, specifications, procedures, and other action necessary to the construction of such facilities; and the erection, building, acquisition, alteration, remodeling, improvement, or extension of such facilities; and the inspection and supervision of the construction of such facilities;

(4) "waste treatment facilities" means the various devices used in the treatment of sewage or industrial wastes of a liquid nature, including the necessary intercepting sewers, outfall sewers, pumping, powers, and other equipment, and their appurtenances, and includes any extensions, improvements, remodeling, additions, and alterations thereof;

(5) "State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, and Guam; and

(6) "person" means any individual, partnership, corporation, association, or other legal entity, and includes an officer, member, or employee of such entity who as such officer, member, or employee is under a duty to perform the act in respect of which the violation occurs.

NATIONAL EFFLUENT CHARGES

SEC. 4. (a) In furtherance of the purpose of this Act, the Administrator and the Secretary of the Treasury shall prescribe such regulations as are necessary to establish and put into effect not later than June 30, 1972, a schedule of national effluent charges for all those substances other than domestic sewage which detract from the quality of the water for municipal, agricultural, industrial, recreational, sport, wildlife, and commercial fish uses. In determining such charges the Administrator shall consider the relationship between the quantity and quality of the waste discharged and the resulting damage to the quality of the waterway as the base for specific charges. Charges established pursuant to this subsection with respect to biological waste shall be at a rate of at least ten cents per pound. Such regulations shall also provide for making available as public information all amounts collected pursuant to such charges.

(b) Revenues collected by the Secretary of the Treasury pursuant to such charges shall be deposited in a trust fund (hereinafter referred to as the "fund") in the Treasury to be available without further appropriation to the Administrator for use as prescribed in section 5.

(c) Any person who willfully fails to pay any charge as required by regulations established pursuant to this section or who willfully fails to make any return, keep any records, supply any information, or to do any other act required by such regulations shall be guilty of a misdemeanor and, upon conviction thereof, shall be fined not more than $10,000, or imprisoned not more than one year, or both, together with costs of prosecution.

(d) The United States district courts shall, upon petition by the appropriate United States attorney or the Attorney General on behalf of the United States, have jurisdiction to restrain violations of regulations established pursuant to this Act.

USE OF FUNDS

SEC. 5. The Administrator shall distribute from the fund in each fiscal year such amounts for the purposes of sections 6 and 7 as he determines will best carry out the purpose of this Act.

GRANTS TO MUNICIPALITIES

SEC. 6. From allocations pursuant to section 5 the Administrator shall make grants to municipalities in any State for the construction of waste treatment facilities. Such grants shall be made on a priority basis determined by the Administrator in accordance with the purpose of this Act in such manner as to provide for such facilities where the need is greatest.

GRANTS TO REGIONAL MANAGEMENT ASSOCIATIONS

SEC. 7. From allocations pursuant to section 5 the Administrator shall make grants to regional water basin management associations for the construction of waste treatment facilities. Such grants shall be made (1) in amounts determined on the basis of the population of the area to be served and the urgency of the need, and (2) subject to the condition that—

(A) the association has developed and submitted to the Administrator a comprehensive water pollution control plan for the region over which it has jurisdiction;

(B) such region covers the area of one or more river basins in one or more States or is an area in one or more States of related land uses;

(C) the Administrator determines that such plan provides for a coordinated attack on water pollution and other related con-

servation problems in such region, including the construction of adequate waste treatment facilities and such other actions as are necessary to carry out such plan, and provides for the levying of waste treatment and other appropriate charges in such amounts as will pay the costs of carrying out such plan; and

(D) such association is a permanent organization with authority (including enforcement authority) to carry out such plan.

OTHER CONDITIONS AND REQUIREMENTS

SEC. 8. The Administrator may establish by regulation such other conditions and requirements for grants pursuant to this Act as he determines necessary to carry out the purpose of this Act.

By Mr. HUGHES:

S. 2697. A bill for the relief of Marie Tjernagel and others. Referred to the Committee on the Judiciary.

Mr. HUGHES. Mr. President, today I am introducing legislation to authorize and direct the Secretary of the Treasury to pay the claim of the Tjernagel family and other Iowans resulting from the crash of an Iowa Air National Guard jet aircraft on their family farm in Hamilton County, Iowa, on December 9, 1968.

Mr. and Mrs. Peter Tjernagel were in their farmhouse with their children that December evening when a military jet crashed a few feet away, killing both crewmen aboard. The plane was on a training mission.

Flaming jet fuel and wreckage destroyed the family farmhouse, other farm buildings, grain, equipment, and the personal belongings of the entire Tjernagel family. The family escaped that night with just the clothes on their backs, some of them suffering with cuts, burns, and bruises.

The next day personnel from the Air Force and the Iowa attorney general's office both arrived on the scene. According to reports from the family and State officials, the Air Force officers indicated that they would handle processing of the claims and make any necessary payments. They advanced $5,000 to the family to tide them over.

The Tjernagels moved into a rented home in nearby Story City, Iowa, and began an enormous task, listing all the destroyed items along with their value, preparing affidavits and otherwise complying with the requirements set by the Air Force. The attorney for the Tjernagels conferred many times by telephone and in person with Air Force personnel while compiling the damages for the claims. Air Force representatives assured him that the Air Force was responsible and would pay the Tjernagels for the damages suffered by them. Two and a half years later the Air Force notified the State of Iowa that the Air Force would not accept responsibility. They advised the family to file their claim against the State of Iowa.

In my judgment, this is an intolerable situation. No matter who is to blame for the crash, the Tjernagel family should not be made to suffer the material hardship and emotional torture of a continuing legal battle between the Federal Government and the State of Iowa.

I requested from the attorney for the Tjernagel family a list of the individual Iowans affected and their specific financial claims against the Air Force. The total amount of these claims is $111,994.88.

The Tjernagels have suffered long enough. Mr. Peter Tjernagel died a few months after the accident leaving his wife, Marie, and four children, Michael, Martin, Sigrid, and Ingeborg. Their grief has been immense. There is no way to repay them for their suffering. But this legislation will enable them to replace their material losses, and I am hopeful it will receive early approval.

By Mr. ANDERSON (for himself, Mr. MONTOYA, and Mr. BENTSEN):

S. 2699. A bill to authorize the acquisition of lands within the Vermejo Ranch, N. Mex., and Colo., for addition to the national forest system, and for other purposes. Referred to the Committee on Agriculture and Forestry.

Mr. ANDERSON. Mr. President, I am today introducing legislation which will enable this and future generations to continue enjoying one of the most beautiful forest and high country areas in the Nation.

Known as the Vermejo Ranch, this area of more than 500,000 acres in northern New Mexico is in danger of being lost to undesirable exploitation, because the present owners are unable to maintain it, because of financial reasons and must sell. The owners prefer to sell to the Government in order to assure that the area will remain intact and protected for public use, rather than exploited for commercial purposes such as mining and extensive timbering.

The sentiment in the Southwestern region appears to be unanimously in favor of saving the ranch for public use.

I have received many letters supporting Government ownership; and, indeed, the State of New Mexico has also considered purchasing the ranch, but its financial resources appear to be limited.

My legislation would authorize the purchase of the ranch and add the acreage to the national forest system. I must say quite frankly that the expense will be fairly substantial, because of the large tract of land involved. I have been informed by the U.S. Forest Service that appraisers have set $26 million as a fair market value for the ranch. We are exploring other possiblities, however, including land exchanges, partial gifts, et cetera, in order to bring down the cash outlay figure. At any rate, there is every prospect that the price will never be reduced, but will continue to climb the longer we delay.

On the other hand, there is a very real possibility that if the Congress does not act quickly, the ranch will be sold to commercial interests and exploited in such a fashion that its beauty and grandeur will be irrevocably lost.

Acreage in the area began to be purchased in 1945 by Mr. W. J. Gourley, a prominent businessman from Fort Worth, Tex. Mr. Gourley developed this land for the next 25 years with the result being an outstanding hunting, fishing, and general recreation area, in addition to the ranchlands. Mr. Gourley died on August 9, 1970, and the heirs have been forced to put up the ranch for sale to meet the estate tax requirements.

The land includes more than 60 high country fishing lakes with approximately 2,000 surface acres and well over 100 miles of trout streams. Artesian water is available in the vicinity, including an old oil well exploration hole which has been flowing surface water for more than 10 years, and in the adjacent "bubbling" lake which gushes water above the lake surface.

The ranch also contains one of the most outstanding hunting and fishing areas in the Southwest. Big game populations are estimated to be 5,000 to 7,000 elk; 40,000 deer; several thousand turkeys; 200 to 300 antelope; four bull buffalo; and an undetermined number of bear and mountain lion. Small game includes grouse, quail, dove, ducks, rabbits, and squirrels.

Before Mr. Gourley acquired the land, most of the acreage was grazed under leases. There was, consequently, severe erosion. Mr. Gourley, dedicated to reviving the land, spent 25 years in replenishing the valuable land, using improved management, reduced stock and range improvements to stabilize and improve the area. He also constructed a large owner's headquarters with guest facilities, a complete manager's office, and working ranch headquarters at Vermejo Park.

The entire ranch makes up one of the most beautiful, valuable tracts of land in the United States—too valuable to be considered merely for its commercial benefits. I have become convinced that it is in the highest public interest to see this land become part of the national forest, so that it is saved for future generations to savor and enjoy.

By Mr. FULBRIGHT (by request):

S. 2700. A bill to extend diplomatic privileges and immunities to the mission to the United States of America of the Commission of the European Communities and to members thereof. Referred to the Committee on Foreign Relations.

TO EXTEND DIPLOMATIC PRIVILEGES AND IMMUNITIES TO THE MISSION TO THE UNITED STATES OF AMERICA OF THE COMMISSION OF THE EUROPEAN COMMUNITIES AND TO MEMBERS THEREOF

Mr. FULBRIGHT. Mr. President, by request, I introduce for appropriate reference a bill to extend diplomatic privileges and immunities to the mission to the United States of America of the Commission of the European Communities, and to members thereof.

The bill has been requested by the Assistant Secretary of State for Congressional Relations and I am introducing it in order that there may be a specific bill to which Members of the Senate and the public may direct their attention and comments.

I reserve my right to support or oppose this bill, as well as any suggested amendments to it, when the matter is considered by the Committee on Foreign Relations.

I ask unanimous consent that the bill be printed in the RECORD at this point,

together with the letter from the Assistant Secretary of State dated September 28, 1971, to the Vice President.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

S. 2700

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That under such terms and conditions as he shall determine and consonant with the purposes of this Act, the President is authorized to extend, or to enter into an agreement extending, to the Mission to the United States of America of the Commission of the European Communites, and to members thereof, the same privileges and immunities subject to corresponding conditions and obligations as are enjoyed by diplomatic missions accredited to the United States and by members thereof.

DEPARTMENT OF STATE,
Washington, D.C., September 28, 1971.

Hon. SPIRO T. AGNEW,
President of the Senate,
U.S. Senate.

DEAR MR. PRESIDENT: I have the honor to transmit herewith for the consideration of the Senate a bill "To Extend Diplomatic Privileges and Immunities to the Mission to the United States of America of the Commission of the European Communities, and to members thereof" (hereinafter "the Bill").

The purpose of the draft bill is to provide the President with the authority to extend to the Mission to the United States of the Commission of the European Communities (hereinafter "the Community") and to members thereof, the same privileges and immunities, subject to corresponding conditions and obligations, as are enjoyed by members of diplomatic missions accredited to the United States.

In the President's report to Congress in February, he stated that "there have been suggestions for expanding our consultation, including the possibility of higher-level representation in Washington. We would welcome to the implementation of any such suggestion that the Community might propose . . . because of the importance of close consultation." In furtherance of these objectives cited by the President, the Community is now making the final arrangements to establish a permanent high-level mission in the Unted States. It will be headed by Aldo Maria Mazio, until recently the Italian Ambassador to Belgium. The Ambassador is expected to arrive in Washington in mid-October with his staff.

The American Mission to the Community and its members have always enjoyed full diplomatic status, and both we and the Community would like its mission to the United States, and its members, to possess similar privileges and immunities. This, however, requires a special Act of Congress since under customary international law, diplomatic privileges and immunities are a concomitant only of relations between states as opposed to relations between a state and an international organization or a supra-national body possessing certain attributes of sovereignty, such as the Community. Thus, members of our Mission to the Community, though accredited to the Commission, are granted privileges and immunities by the Government of Belgium in accordance with its obligations under the Treaty of Rome as a Community host government. The Mission of the Community to the UK, and its members, enjoy privileges and immunities as the result of an act of Parliament. In the United States, representatives to and employees of international organizations, of which the United States is a member, may enjoy certain privileges and immunities for their official acts under the International Organizations Immunities Act. More comprehensive privileges and immunities may be granted members of missions to the United Nations under the Headquarters Agreement, which was enacted by the Congress as a Joint Resolution in 1947, and under the Convention on Privileges and Immunities of the United Nations, which was acceded to by the United States, by and with the advice and consent of the Senate, in 1970. In addition, by virtue of an agreement authorized by special legislation, representatives of member states, and certain members of their staffs on the Council of the OAS located in Washington may enjoy full privileges and immunities.

In addition to the desire to reciprocate the privileges and immunities enjoyed by our official representatives to the Community, a grant of privileges and immunities to the Community's mission and its members can be justified on the grounds of the Community's unique legal and political character. The Community is a *suit generis* organization with attributes of sovereignty which approaches the character of a supra-national body. Thus, through its extensive central institutions with governing authority in certain areas and its authority to conduct a broad range of international relations on its own behalf, the Community is clearly distinguishable from an international organization. Notably the American diplomatic mission to the Community is the sole instance of official diplomatic relations by the United States with an entity other than a state, as distinguished from U.S. representation, by virtue of its membership, in certain international organizations. In 1967, the Internal Revenue Service determined that the Community constituted a foreign government for the purposes of the exemption from federal income taxation of its representatives and employees residing in the U.S.

Given the desire to accord privileges and immunities to the Community's representatives a special amendment to the International Organizations Immunities Act to provide only "official acts" immunities would not suffice. Accordingly, the proposed bill is modeled generally after the legislation authorizing the President to extend, subject to corresponding conditions and obligations, privileges and immunities to representatives of member states on the Council of the OAS and to members of their staffs. The draft bill, however, refers to "members" of missions which is defined by the Vienna Convention on Diplomatic Relations (to which the Senate has given its advice and consent but which has not yet been ratified), to encompass both the head of a mission and its staff. In addition, the bill, if passed, would also authorize the President to extend privileges and immunities to the mission itself as well as to its members.

The Department has been advised by the Office of Management and Budget that from the standpoint of the Administration's program there is no objection to the submission of this legislation to the Congress for its consideration.

Sincerely yours,

DAVID M. ABSHIRE,
Assistant Secretary for Congressional Relations.

ADDITIONAL COSPONSORS OF BILLS AND JOINT RESOLUTIONS

S. 2148

Mr. MATHIAS. Mr. President, I ask unanimous consent that the distinguished senior Senator from Oregon (Mr. HATFIELD) be added as a cosponsor of S. 2148, the Juvenile Delinquency Prevention and Rehabilitation Act of 1971, bringing to 31 the number of my colleagues who have joined me in sponsoring what I consider landmark legislation.

The PRESIDING OFFICER. Without objection, it is so ordered.

S. 2440

At the request of Mr. CRANSTON, the Senator from Wisconsin (Mr. NELSON) was added as a cosponsor of S. 2440, a bill to amend title 23 of the United States Code to authorize construction of exclusive or preferential bicycle lanes, and for other purposes.

SENATE JOINT RESOLUTION 164

At the request of Mr. GRIFFIN, the Senator from Nevada (Mr. BIBLE), the Senator from Utah (Mr. BENNETT), the Senator from Arizona (Mr. FANNIN), and the Senator from Idaho (Mr. JORDAN) were added as cosponsors of Senate Joint Resolution 164, proposing an amendment to the Constitution of the United States relating to the assignment and transportation of pupils to public schools.

SENATE JOINT RESOLUTION 165

At the request of Mr. TALMADGE, the Senator from North Carolina (Mr. JORDAN) was added as a cosponsor of Senate Joint Resolution 165, proposing an amendment to the Constitution of the United States prohibiting involuntary busing of students.

RURAL COMMUNITY DEVELOPMENT REVENUE SHARING ACT OF 1971—AMENDMENT

AMENDMENT NO. 470

(Ordered to be printed and referred to the Committee on Agriculture and Forestry.)

Mr. ALLEN (for himself, Mr. HUMPHREY, and Mr. TALMADGE) submitted an amendment in the nature of a substitute to the bill S. 1612 to establish a revenue-sharing program for rural development.

FAIR CREDIT BILLING ACT—AMENDMENT

AMENDMENT NO. 471

(Ordered to be printed and referred to the Committee on Banking, Housing, and Urban Affairs.)

Mr. PROXMIRE. Mr. President, I am introducing an amendment to S. 652, the Fair Credit Billing Act. The purpose of the amendment is to clarify the intent of the legislation to regulate unfair billing practices on the part of creditors regardless of whether the creditor imposes a finance charge.

The Fair Credit Billing Act requires creditors to respond to customer billing disputes within 30 days or forfeit the amount in dispute. Since the Fair Credit Billing Act was introduced in the form of an amendment to the Truth in Lending Act, the definitions contained in the Truth in Lending Act are applicable to the terms used in the proposed fair credit billing legislation. The Truth in Lending Act was concerned with the proper disclosure of finance charges and accordingly the term creditor was defined as a person who extended credit for which the payment of a finance charge was required.

Unfortunately, this restrictive definition of a creditor does not remedy some of the most widespread abuses in the credit billing area. For example, the issuers of travel and entertainment credit

cards such as American Express, Diner's Club, and Carte Blanche would not be covered under the fair credit billing legislation since they do not impose a finance charge on their customers.

Many of the complaints I have received about difficulties consumers have had in resolving billing disputes have involved the three companies I have named. It was always my intent to extend the provisions of the fair credit billing legislation to the issuers of travel and entertainment cards. Therefore, the amendment I have introduced does not change the original intent of the legislation, but merely perfects a technical error in the drafting of the original bill.

I am introducing this amendment at this time so that the intent of the legislation would be clear to all parties concerned during the forthcoming hearings on the legislation which have been scheduled for October 26 through October 29.

NOTICE OF HEARINGS ON CORPORATE SECRECY

Mr. NELSON. Mr. President, the Subcommittee on Monopoly of the Senate Select Small Business Committee held hearings in 1969 on "The Role of Giant Corporations in the American and World Economies—Part I—Automobile Industry."

Those hearings explored such industrial giants as General Motors and their effect on the world market.

The next round of hearings—"Part II—Corporate Secrecy"—which begin November 9, will again look at GM and other massive conglomerates.

It is not surprising that the giant American corporations, operating within tight, highly organized and structured conglomerates with extensive holdings throughout the world, are called "private governments."

It is not surprising, because these American industrial giants profoundly affect the standard of living and the quality of life in the countries in which they operate.

And to small businesses, dependent on the giants as suppliers, customers, competitors, or all three, the decisions and actions of these "private governments," often carry more force and have more influence than the directives of public governments.

The decisions reached in the guarded boardrooms of the corporations determine whether there will be new jobs in Milwaukee, Wis., or in Frankfurt, Germany, or in Hong Kong. They make the decisions on pay and working conditions and directly establish the standards of living for the countries in which they operate. In fact, few governments can claim as much influence on the economic structure of a country and its standard of living.

The power of giant corporations is well known to environmentalists who have watched with pained frustration as the corporate decision is the final and often only one whether a virgin forest will be felled this year or next; whether a river or lake will be clean or polluted, or whether the air will be healthy and clean, or foul tasting and poisonous to all living creatures.

In the cities, they decide which neighborhoods shall live or die and who shall benefit from the services and priorities the corporation decides it needs.

The pervasiveness of the power of giant corporations is also very real to the farmer. The decisions of agribusiness conglomerates determine not only which farm products will be bought, where, and at which prices, but even whether family farming will or will not remain economically feasible in certain regions and in certain crops.

In 1968 I chaired hearings on the question of corporate farming and will renew that study during this phase of hearings on November 16 and 17.

The Federal Trade Commission's Bureau of Economics' Economic Report on Corporate Mergers reported that by the beginning of 1969, 87 corporations, each with assets of $1 billion or more, accounted for 46 percent of all assets owned by corporations primarily engaged in manufacturing. The same report also points out:

> Although the number of corporations of every size has expanded substantially during the past decade, only those in the $1 billion and over class have enlarged their share of total assets—from 26 to 46 percent. Despite an increase of over 40,000 in the number of corporations with assets under $10 million during the past decade, their share of the total assets fell from 20 percent to 14.
>
> Even greater than the largest corporations' share of assets is their share of profits. By 1969, the 87 largest corporations received a share of the net profits of all manufacturing corporations equal to that of the over 194,000 other manufacturing corporations.
>
> The 2,593 corporations with assets of $10 million or more represented less than 1 percent of all manufacturing businesses, but they held 86 percent of the total assets and received 88 percent of the net profits of all manufacturing corporations.

To repeat, less than 1 percent of the manufacturing businesses in the country have 86 percent of the assets and 88 percent of the net profits.

In 1970, of the 51 largest "money powers" in the world, only 38 were sovereign national states, while 13 were multinational business corporations.

As part of the monopoly subcommittee's hearings on giant corporations, a list of countries and companies interspersed, ranked by size of national gross national product and corporate net sales, was printed in the record. The 1970 list has been prepared by the Library of Congress and will be appended to this statement.

That latest report reveals that General Motors, despite an uncommonly bad year in 1970, was still 23 on the list of world money powers, larger than 123 of the world's 146 nations. American Telephone & Telegraph, No. 25, was a bigger power in money terms than South Africa. Standard Oil of New Jersey and Ford Motor Co., Nos. 27 and 28, were each bigger than either Denmark or Austria. Royal Dutch/Shell, No. 32, was ahead of Norway. Sears Roebuck, No. 37, was larger than Greece. General Electric, No. 39, outranked the Phillipines and Turkey. International Business Machines, Mobil Oil, Chrysler and Unilever, occupying slots from 44 through 46, came ahead of Thailand and Colombia. ITT, No. 49, and Texas, No. 51, straddled Chile in the 50th position.

Comparing private corporate giants with public governments is not an argument that bigness is in itself bad, but an argument that governments—public and private—derive their powers from the consent of the governed and are responsible to those they govern.

The central question the next phase of the giant corporations hearings will explore is not so much whether the powers now plainly exercised by the multinational business concerns are just or unjust, or even whether those powers are exercised with or without the consent of the governed—although those questions will be open to discussion.

The central question will be whether it is possible for the public to make real, meaningful decisions when it has insufficient information about essential matters on which it should have the opportunity to choose.

How, for example, can any one of the 200 million Americans importantly affected by the matter make any decision on the pricing policies of the automobile manufacturers when the costs of building a car are nowhere made known?

How can the people of this country evaluate the social, economic, and political implications of the increasing dominance of giant corporations in agriculture when adequate data are not available anywhere?

How can anyone consent or dissent to what is happening, profitwise, in the food and kindred products industry, as reported in an official statistical service of the Federal Government, when the operating results of important defense, electronics and aerospace firms are averaged into the industry "food and kindred products?" The Government's statistical practices appear to be based more on habit and corporate power than on logic. See "Working Paper A" appended to this statement.

In "Working Paper A" appended to this statement, it is demonstrated that a small manufacturer making a large profit—or loss—must declare that profit or loss to the world at large, including his competitors; while a large manufacturer, with identical sales and an identical or larger profit, made on the same product, is allowed to keep the figures entirely secret.

To help stimulate thinking about the important subject of these hearings, two documents have been prepared.

The first is a list of 16 major questions with which the subcommittee will be concerned in the hearings on corporate secrecy.

The second is a working paper that presents some preliminary thinking about the first 3 of the 16 major questions, and notes some of the additional questions that are suggested by this preliminary consideration of the major questions.

Mr. President, I ask unanimous consent that there be inserted in the RECORD at this point the following documents:

First, list prepared by the Congressional Research Service, Library of Congress, entitled, "Gross National Products of Countries and Net Sales of Companies Interspersed: Top 51, by Rank—1970."

Second, list prepared for use at hearings on "Corporate Secrecy," captioned

"Sixteen Major Questions To Be Considered by the Subcommittee."

Third, a working paper, prepared by myself and Raymond D. Watts of the staff of the Senate Small Business Committee, entitled, "The Nature and Dimensions of Corporate Secrecy."

There being no objection, the material was ordered to be printed in the RECORD, as follows:

THE LIBRARY OF CONGRESS, CONGRESSIONAL RESEARCH SERVICE

GROSS NATIONAL PRODUCTS OF COUNTRIES AND NET SALES OF COMPANIES INTERSPERSED: TOP 51, BY RANK—1970

This table is a combined listing of the leading international corporations and the top producing nations of the world. Corporations are listed with their annual net sales, which were taken from the May and August 1971 issues of *Fortune* magazine. The non-Communist GNP figures are from *Gross National Product, Growth Rates and Trend Data by Region and Country;* May 15, 1971, compiled by the Office of Statistics and Reports, Bureau for Program and Policy Coordination, Agency for International Development. Communist countries' GNP figures were estimated by the U.S. Department of State. All figures are for 1970, with the non-Communist countries' GNP data in constant 1969 prices, and the Communist countries' GNP data estimated in 1970 dollars. All figures are in billions of dollars.

(In billions of dollars)

Country:	Amount
1. United States	$927.6
2. Soviet Union	[1] 478.0
3. Japan	185.6
4. West Germany	172.7
5. France	138.0
6. United Kingdom	111.8
7. Italy	87.3
8. China (Mainland)	[1] 86.0
9. Canada	75.0
10. India	50.0
11. Poland	[1] 46.1
12. East Germany	[1] 39.7
13. Brazil	33.7
14. Czechoslovakia	[1] 32.5
15. Australia	31.6
16. Mexico	31.6
17. Spain	30.7
18. Netherlands	29.8
19. Sweden	29.4
20. Belgium	24.1
21. Argentina	21.0
22. Switzerland	19.6
23. General Motors	18.8
24. Pakistan	17.2
25. American Tel. & Tel	17.0
26. South Africa	16.8
27. Standard Oil (N.J.)	16.6
28. Ford Motor	15.0
29. Denmark	14.6
30. Austria	13.2
31. Indonesia	12.8
32. Royal Dutch/Shell	10.8
33. Norway	10.1
34. Venezuela	10.1
35. Iran	9.9
36. Finland	9.7
37. Sears Roebuck	9.3
38. Greece	9.0
39. General Electric	8.7
40. Philippines	8.5
41. Turkey	8.2
42. Korea	7.8
43. International Business Machines	7.5
44. Mobil Oil	7.3
45. Chrysler	7.0
46. Unilever	6.9
47. Thailand	6.8
48. Colombia	6.6
49. International Tel. & Tel	6.4
50. Chile	6.3
51. Texaco	6.3

[1] Purchasing power equivalent in 1970 dollars, as estimated by U.S. Department of State.

Steve Wolf, researcher, economics division, August 6, 1971.

HEARINGS ON CORPORATE SECRECY, BEFORE THE SUBCOMMITTEE ON MONOPOLY OF THE SELECT COMMITTEE ON SMALL BUSINESS, U.S. SENATE

SIXTEEN MAJOR QUESTIONS TO BE CONSIDERED BY THE SUBCOMMITTEE

A. Nature and dimensions of corporate secrecy

Question 1. What is meant by the term "corporate secrecy"?

Question 2. What are the principal aspects and types of corporate secrecy?

Question 3. What are the economic and social purposes, benefits, costs and implications of corporate secrecy, from the viewpoints of giant corporations, small businesses, consumers, farmers, inventors, investors, economists, scholars, labor, regulatory agencies concerned with such matters as fair pricing and the protection of the environment, and other groups in the society?

B. Regular and routine corporate information disclosure today

Question 4. What kinds and quantities of information are the giant corporations furnishing to the public, to government, or to both today—

(a) through their published annual reports and voluntary disclosures to private directories and various business and investor publications?

(b) through required filings with various agencies of Federal, State and local government?

Question 5. How accessible or inaccessible to the public is the information previously filed and currently being filed by giant corporations with the various agencies of government?

Question 6. What problems of comparability and comprehensibility exist in using corporate information filed with government?

C. Irregular and occasional corporate information disclosure

Question 7. What kinds of information about giant corporations have come into the public domain through other than routine sources, such as—

(a) public records of litigation in Federal and State courts?

(b) Congressional hearings records?

(c) revelations of corporate insiders and former insiders?

Question 8. How can the small businessman and small farmer (and their lawyers), the small investor (and his market analyst or mutual fund), the working man (and his trade union), the consumer (and his public advocates), and all the other interested persons find—and use—the information that is technically "available"—but deeply buried—in these obscure, immense and labyrinthine sources?

Question 9. How can the groups mentioned in Question 8 themselves employ these special and occasional agencies—the courts, the Congress, corporate "whistle blowers"—to cause corporate giants to disclose further information?

D. Routine corporate non-disclosure today: proper and improper areas of secrecy

Question 10. What kinds of information from and about giant corporations should be but are not today routinely available to the public, in a systematic, accessible form?

Question 11. What kinds of information are giant corporations today furnishing to government agencies (and to what government agencies) "in confidence"—that is, with a promise from the government that the public will have no access to it?

Question 12. What are the proper purposes, scope and limitations of confidential treatment for corporate disclosures to government agencies?

Question 13. What are the legitimate, defensible purposes and areas of corporate secrecy? How much and what kinds of corporate information quite properly should be withheld—

(a) from the public at large but not from government?

(b) from everyone outside the company, including government?

E. Areas for administrative improvement

Question 14. Which government agencies, under existing statutory authority, could do a better job of collecting and publishing information from and about giant corporations? How?

F. Areas for legislative improvement

Question 15. What existing legislation impairs or impedes disclosure of information about giant corporations that should be in the public domain but is not?

Question 16. What existing legislation should be amended or repealed, and what new legislation should be considered and enacted, to cause information about giant corporations to come into the public domain in more adequate quantity and quality and in more accessible forms and places?

WORKING PAPER A: THE NATURE AND DIMENSIONS OF CORPORATE SECRECY

THE SUBCOMMITTEE'S MAJOR QUESTIONS 1 THROUGH 3: DISCUSSION, THEORIES, AND SOME FURTHER QUESTIONS*

Question 1. What is meant by the term "corporate secrecy"?

As used here, "corporate secrecy" means the conscious, deliberate withholding from the public, for whatever reasons, of valuable information possessed by corporate management. Unless you say more than that, you cannot say that corporate secrecy is "good" or "bad." Some types of corporate secrecy serve useful economic and social ends. Other types do not. Also, the same type of corporate secrecy may be "good" in one context and "bad" in another. For example, it may be proper and even desirable for small, simple corporations to keep to themselves certain kinds of information, while it would be undesirable for giant, complex corporations to keep the same kind of information secret. One theory the hearings* will explore is that, as things often work out today, the actual situation is just the reverse: small business must live in a goldfish bowl, while big business successfully hides from the public information that should be freely available to help competitive capitalism work better for all the people.

Question 2. What are the principal aspects and types of corporate secrecy?

As these hearings begin, the Subcommittee will be thinking about the policies and practices of giant corporations in concealing or disclosing seven types of valuable information. They are:

(1) Financial information about the separate organizational, industrial and geographical segments of the business, and the interrelationships of the segments;

(2) Information on industrial and natural resources ownership and control;

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* This working paper was prepared by Senator Gaylord Nelson, Chairman, Subcommittee on Monopoly of the Senate Small Business Committee, with the assistance of the subcommittee staff. It is intended to serve as an aid to discussion at hearings on Corporate Secrecy. This paper has not been approved or disapproved by other members of the subcommittee or full committee and should not, therefore, be read as necessarily reflecting the views of either. (Footnotes are at the end of the paper.)

(3) Product information needed by or valuable to consumers;

(4) Information on new discoveries, and on how and why decisions are made to put on the market or withhold from the market new products and technologies;

(5) Information about government procurement and government contracts;

(6) Environmental impact information; and

(7) Information on employment policies and working conditions.

Obviously it will be a hard job and take a long time to look into all those areas of corporate secrecy. In the first phase of the hearings—a phase that may take a year or more—the subcommittee will be primarily concerned only with the first two, although we will not prevent witnesses from offering testimony on any others, including areas not even mentioned in this list.

(Question 2–1. In addition to the seven listed in "Working Paper A," what other aspects and types of corporate secrecy deserve Congressional consideration?)

But in this paper the remaining discussion will be limited to the subject of concealment and disclosure by giant corporations of the financial aspects of their operations. The main—and staggeringly large—questions are:

(Question 2–2.) What are the giant corporations' investments, costs, profits and losses, itemized along recognizable, comparable organizational, industrial and geographical lines?

(Question 2–3.) What do the giant corporations own, in the way of industrial and natural resources?

(Question 2–4.) And who owns the giant corporations?

There should be no illusions—we have none—that one Senate subcommittee, with a tiny budget and staff, is going to come up with very many previously unknown answers to questions such as those, although we shall surely try. It will be cause for pride if even a few of the nuggets of valuable knowledge, now stubbornly concealed, are unearthed.

Rather, the objective and hope are to make a record that will show how large the areas of secrecy are. That, in turn, may assist the Congress in making judgments on how much of the business secrecy—now practiced and defended in the name of free enterprise—is actually harmful to free enterprise, small business, and the general public. Finally, the record may show what can and must be done to move the country toward a wider, more equitable sharing of industrial information, to the benefit of both economic and political freedom.

Our ultimate aim is to restore force and meaning to the proud American claims, now dubious, that ours is an open society and a competitive system.

Question 3. What are the economic and social purposes, benefits, costs and implications of corporate secrecy, from various viewpoints?

Remarks of two witnesses at separate Senate subcommittee hearings in recent years illustrate the way the same kind of secrecy—or disclosure—can look good or bad, depending on the point of view.

Auto manufacturers' viewpoint: Secrecy beneficial, disclosure harmful

In 1969, testifying before this subcommittee, the president of the Automobile Manufacturers Association said:

"The disclosure of detailed financial data by a company would enable competitors to determine its points of weakness and strength. The competitors could then avoid a competitor's strengths and exploit his weaknesses. Detailed knowledge of a competitor's cost and profit data would, for example, assist a manufacturer in making decisions about his own production of a competitive unit. Accounting methods and procedures themselves are considered important managerial tools and proprietary in nature; release of detailed data through which these methods and procedures could be revealed would be, in my opinion, undesirable." [1]

Federal Trade Commission's viewpoint: Secrecy harmful, disclosure beneficial

In 1970, testifying before the Senate Judiciary Subcommittee on Antitrust and Monopoly, the chairman of the Federal Trade Commission said:

"In a market economy, the response of businessmen and investors to profit opportunities critically determines the rational allocation of resources. In recent years as more industries have come under the control of conglomerates, profit information on a product basis has become progressively less available. We recommend that the SEC in consultation with the FTC be directed to expand its product line reporting requirements for multiproduct firms." [2]

In other words, it almost certainly is not good, from its own viewpoint, for a giant manufacturing company to let the public (and thereby its competitors) know that it is realizing a 75 percent return on investment in a particular product line—let's say, for hypothetical example, golf carts. But just as certainly, it is good for the competitive process and the consumers of golf carts for the word to get around. As the FTC chairman noted, "the response of businessmen and investors to profit opportunities" suggested by the knowledge that one company is making a 75 percent return on its investment in golf cart manufacturing would result in a "rational allocation of resources" by other profit seekers, who would rush to invest in that industry, thereby increasing supplies of—and competition in—golf carts; thereby, in all probability, bringing the prices and profits down to more normal and reasonable levels.[3] But from the AMA president's viewpoint, and the successful company's, news of the killing in golf carts should be carefully concealed by burying the cost and profit data for that product line in a mass of consolidated figures, to avoid revealing anything meaningful that a competitor could "exploit." Among the meaningful things thus to be concealed are bits of information that might tip off competitors (or, perhaps, the tax and antitrust authorities) about "proprietary" accounting systems.

The FTC chairman wanted this clear and possibly irreconcilable conflict between the public and corporate interests to be resolved in the public's favor. He recommended that the SEC in consultation with the FTC be directed to expand its product line reporting requirements for multiproduct firms.

Some idea of the extent to which that excellent recommendation has been carried out thus far may be obtained by considering two examples, one hypothetical and one actual. The hypothetical example relates to progress at the SEC and the actual example to progress at the FTC in the expansion of "product line reporting requirements for multiproduct firms."

The SEC, form 10–K, and two golf cart manufacturers

Let us first consider the impact of present (recently revised and improved) SEC reporting requirements on two imaginary firms, company A and Company B, each of which, in 1970, had sales of golf carts amounting to $2.7 million. (Golf carts, it may here usefully be noted, are classified by the Bureau of the Census as one of seven product lines of an industry group styled "Motorcycles, bicycles and parts.")

Company A manufactures a fairly complete line of "motorcycles, bicycles and parts," and nothing else. Its 1970 sales totaled $17 million. Golf carts accounted for 16 percent of total sales and (because they were quite profitable), 22 percent of total company profits. Company A, in 1970, realized 4 percent on its sales over-all. It has always reported only consolidated sales, costs and profits in its annual reports to its stockholders and the SEC; but an attorney-examiner for the SEC is now strongly suggesting that, pursuant to Item 1(c)(2) of the annual report form, Form 10–K as recently amended, Company A should itemize the contributions to sales, separately, made by the following "classes of similar products": (1) motorcycles, (2) bicycles, (3) golf carts, and (4) parts for motorcycles, bicycles and golf carts. If it doesn't like that, the examiner says, Company A could elect instead, under Item 1(c)(1), to report separately the contributions to *sales, profits and losses* made by each of the following two "lines of business": (1) motorcycles, bicycles and parts, and (2) golf carts and parts. The examiner asks whether it is not true that, in 1970, each of those four product lines contributed 15 percent or more to total sales, and each of those two "lines of business" contributed 15 percent or more to either total sales, total profits or total losses. The company admits both statements are true. Therefore, the examiner says, the amended Form 10–K, Item 1(c) requires that Company A report separately as suggested, one way or the other. The company wants to resist this; but its lawyer tells it that, if the SEC insists, the present law would probably sustain the examiner in requiring the disclosure he wants.

Company B also manufactures a fairly complete line of "Motorcycles, bicycles and parts," including golf carts, and its sales in that industrial line amounted to $17 million in 1970. But, in Company B's case $17 million was something under 1 percent of total company sales ($1.9 billion) and less than 10 percent of total sales of "Transportation equipment" amounting to $180 million. Company B's sales of golf carts also happened to be identical to those of Company A: $2.7 million; but, partially because of purchasing and marketing leverage attributable to its great size, Company B's golf cart sales accounted for 29 percent of its total profits in its "Motorcycles, bicycles and parts" lines of business, compared to 22 percent in Company A. However, in its annual reports to stockholders and the SEC, Company B elected to consolidate all financial data pertaining to the "Motorcycles, bicycles and parts" line into another, larger line of business, selected, defined and named by itself: "Consumer durables." Another substantial part of Company B's financial data on products which it reports to the Census Bureau under standard subheadings of the standard industrial classification, "Transportation equipment," it consolidates in its annual reports within another line of business selected, defined and named by itself: "Industrial machinery and supplies." Company B reported to the SEC and the public 1970 sales $210 million and profits of $15.8 million in "Consumer durables" and sales of $350 million and a loss of $1.2 million in "Industrial machinery and supplies." Over-all, Company B reported a return of 4 percent on sales, a performance identical to Company A's. An attorney-examiner at the SEC suggested to Company B's comptroller that it might make more sense to break out and report separately "Transportation equipment" as a line of business. Company B politely but firmly declined, pointing out that "Transportation equipment" is not, in its accounting scheme of things, a regular, recognized "profit center," and, besides, as a line of business "Transportation equipment" did not account for 10 percent of sales, profits or losses; therefore, it is not required to be itemized. (See Item 1(c)(1) of Form 10–K, as amended.) The company's general counsel assured the SEC that Company B would go to the Supreme Court before it would submit to the examiner's suggestion.

Footnotes at end of article.

Small Business Viewpoint: Secrecy Gives Big Business Competitor an Edge

If you were the president of Company A in the foregoing hypothetical, you would probably feel that the SEC's disclosure requirements were giving your giant competitor an important edge on you, in the realm of information, wholly unrelated to any natural or earned market position.

The real world conforms to this imaginary example. At a symposium on public reporting by conglomerates, held at Tulane University in 1968, Dr. David Solomons, professor of accounting at the Wharton School, told the Maytag story:

"A grave inequity is perpetrated by *not* requiring the reporting of segmental results, for companies making a narrow line of products may feel at a disadvantage compared with more diversified companies. A good example is Maytag, specializing in home laundry equipment. Its principal competitors are no more than subdivisions of the major appliance divisions of companies like General Electric, Westinghouse, and the Frigidaire Division of General Motors. Maytag's results are of considerable interest to the home laundry subdivisions of these companies, whereas Maytag can learn little from its competitioner's accounts."[4]

Organized labor viewpoint: Secrecy gives management an unfair advantage

The same advantages of secrecy—or disadvantages, depending on perspective—apply in labor negotiations. The union may suspect that great profits are being made in Company B's golf cart plant and that those profits stem, in part, from labor productivity gains, in the benefits of which labor should share. But if the union cannot get access to the company's records of sales, costs, profits and losses at any level lower than the immense and arbitrary "Consumer durables" line, it can neither confirm nor disprove its suspicion. The company's negotiators, of course, will tell the golf cart plant workers that labor costs are high and labor productivity only so-so in B's "Consumer durables" operations. To arrive at those numbers, to be sure, Company B will have "consolidated"—or averaged—the outstanding labor productivity results in the gold cart plant with the abominable results in another "Consumer durables" plant in another state—a plant making washing machines. But when the union asks for the separate data on the golf cart and washing machine factories, they are told that that is top-secret, proprietary information, the disclosure of which would endanger the job security of every worker in the company's employ. Conclusion of the bargaining: "Sorry, fellows and girls, you 'Consumer durables' workers will just have to get your productivity up before we can get you a raise."

Some further questions

This tale of the two "Motorcycles, bicycles and parts" manufacturers suggests at least the following additional questions:

(Question 3–1.) Given the application of present SEC line-of-business reporting requirements, just revealed, to two companies each making sales of $2.7 million a year in golf carts and also making other sales of other items, should the disclosure requirements for either Company A or Company B, or for both companies, be changed? In what way?[5]

(Question 3–2.) Is there some quantitative measure or benchmark of a company's size, diversification, or both, below which its segregated sales, cost and profit information about a particular product or line of products should be deemed properly proprietary, and above which the corresponding information should be deemed appropriate for itemized public disclosure?

(Question 3–3.) Are there significant policy and conceptual problems involved in reconciling—

(a) the idea of "generally accepted accounting principles," the time-honored term familiar to all readers of CPA certifications of corporate financial statements,

With—

(b) the idea of "accounting methods and procedures [which] themselves are considered important managerial tools and proprietary in nature," the bold concept advanced in the Automobile Manufacturers Association's forthright defense of corporate secrecy, quoted above?

The FTC, the OFR, and the strange case of Ling-Temco-Vought

Others who are disserved and disadvantaged by the consolidation of financial and operating statistics of giant corporations are all the groups that use Federal statistical services for industrial analysis. Here an actual rather than hypothetical example can illustrate the nature and dimensions of problems that are now pervasive.

Since 1947, the Federal Trade Commission and the Securities and Exchange Commission have jointly compiled data for and published a statistical reporting service called the *Quarterly Financial Report for Manufacturing Corporations,* widely[6] and familiarly known as "the *QFR*". This publication purports to give quarterly data on sales, costs and expenses, net profit from operations, other income or deductions (net), net profit before and after Federal income taxes, depreciation and depletion, and several balance sheet items. Separate tables present these statistics, both in dollar-amount and in ratio forms, for all manufacturing corporations in the aggregate, for all manufacturing corporations (all industries) by assets-size classes, for durable goods and nondurable goods corporations by assets-size classes, and for manufacturing corporations "principally" engaged in various named industry groups. Each issue presents separate data in parallel columns for each of the last five quarters, so that trends can be noted.

Publication of the *QFR* costs the taxpayers (in excess of modest revenues from paid subscriptions) about $500,000 per year.[7] The purposes it is intended to serve (some of which it still is serving) are easily worth that amount, and more. Those purposes—paraphrased from a statement in the "Explanatory Notes" at the head of each issue—include aid to government and business planners in analyzing current business conditions, in estimating national income trends, in estimating current tax liability and future tax receipts, and in determining current monetary and credit policy. The *QFR* is also intended to help its readers evaluate the current financial position of small business, and to help the free enterprise economy itself function competitively and efficiently. As the *QFR* "Explanatory Notes" put it, this last, vital purpose is served by enabling thousands of nongovernment subscribers to measure efficiency and appraise costs by comparing a company's operating results with the average performance of companies of similar size or in the same line of business, to determine whether to undertake new ventures by comparing the profitability of various types of business activity, and as a guide to the relative movement of sales and profits in order to reduce controversies in wage negotiations.

Let's see how well the *QFR* serves those purposes by trying a few exercises.

Suppose we want "to determine whether to undertake new ventures" in our old friend, the golf cart industry. Disappointment No. 1: the *QFR* industry groups that seem relevant only go down to "Transportation equipment" and two principal component industry groups thereof, "Motor vehicles and equipment" and "Aircraft and parts." So forget *that* use of the *QFR*; that was an unreasonable expectation anyway.

So let's suppose we own some stock in Ling-Temco-Vought, that astonishing conglomerate that climbed up out of nowhere to become, by 1969, number 14 in *Fortune's* list of 500 industrials ranked by sales. (It was number 15 in 1970.) LTV managed to attain, on consolidated basis, a net loss of almost $38.3 million on sales of over $3.75 billion in 1969, and a net loss of over $69.6 million on sales of almost $3.8 billion in 1970, according to the *Fortune* directories. Concerned by these statistics, we decide to use the *QFR* to compare our company's operating results with the average performance of companies . . . in the same line of business.

Well, this proves to be a little beyond the *QFR*, too, but it takes us longer to find it out. Let's go through the steps. Our first problem, obviously is to determine which "line of business" LTV is in, for purposes of classification in the *QFR*, and how it is doing in its "line of business." For that, we turn to LTV's Form 10–K, the annual report it files with the Securities and Exchange Commission. We know that in 1971, for the first time, diversified corporations whose fiscal years ended on or after December 31, 1970, have been filing sales and income data by "line of business" on a somewhat finer breakdown than previously. That is happening by virtue of a recent change in SEC rules.[8] (We have already glimpsed the new Form 10–K at work in the case of hypothetical Companies A and B above.)

LTV's Form 10–K gives us "approximate" sales and income data for 1969 and 1970 (also 1967 and 1968) for *seven* major lines of business. The aggregate operating results for all seven were $35.3 million income on $3.8 billion sales in 1969, and $7.6 million income on (over) $4 billion sales in 1970. (Never mind the immediately noted discrepancy between those numbers and the ones from *Fortune*; we'll save discussion of that for another time and another working paper.[9]) The seven lines of business and their operating results were as follows:

Steel and ferrous metal products: $17.3 million income on $1.056 billion sales in 1969; $13.1 million net loss on $994.8 million sales in 1970.

Meat and foods: $8 million income on $1.264 billion sales in 1969; $11.3 million income on $1.463 billion sales in 1970.

Aerospace: $10.9 million income on $712.6 million sales in 1969; $7.6 million income on $820.2 million sales in 1970.

Electronics: $3.6 million net loss on $247.3 million sales in 1969; $1.3 million income on $243.3 million sales in 1970.

Air transportation: $3.5 million income on $325.6 million sales in 1969; $1.5 million net loss on $325.6 million sales in 1970.

Wire and cable: $0.2 million net loss on $94.8 million sales in 1969; $2.3 million income on $100.3 million sales in 1970.

Floor covering: $0.6 million net loss on $109.3 million sales in 1969; $0.3 million net loss on $104.7 million sales in 1970.

So, we turn to our *OFR* to compare LTV's operating results with "the average performance of companies . . . in the same line of business."

Since our company is in *seven* major lines of business (at least!), you might think we would check seven different industry groups in the *OFR* to get our comparisons. Seems logical. But wait a minute! Disappointment no. 2: the "Explanatory Notes" tell us—

The consolidated enterprise concept is used in the FTC-SEC quarterly financial estimates.

* * * * *

Industry classification. After a corporation has been introduced into the sample, its *industry* [sic] is classified according to the latest information at hand.[10] [Emphasis supplied, except for paragraph heading emphasized in original.]

Does this mean . . . ? *Could* it mean that LTV's *entire,* consolidated financial data are

Footnotes at end of article.

all assigned to just *one* industry group in the *OFR*? Aghast at the thought, we hasten to other sources, hoping to find out it isn't so.

Unfortunately, it seems that it *is* so, or nearly so.

Inquiry reveals that there is one official list published by SEC, naming most [11] of the major corporations whose financial results are included in the *OFR*. It is called *Directory of Companies Filing Annual Reports With the Securities and Exchange Commission Under the Securities Exchange Act of 1934, Alphabetically and By Industry Groups.* (For sale by the Superintendent of Documents, Government Printing Office; $3.) In the "Introduction" to the latest issue (December 1970), our darkest fears are confirmed. We read:

Definition of reporting unit

The organization or unit classified consists of the company and all subsidiaries included in the consolidated financial statements submitted to the Securities and Exchange Commission.

Basis of company classification

In general each company was classified on the basis of its *major activity* as determined by the product or group of products produced or handled, or services rendered. The *major line of activity as reflected by the gross revenues* of the company was the principal criterion used in classifying the company.

* * * * *

The classification of multi-product or multi-industry companies is based upon available information as to the *relative importance of individual products* or activities in the overall operations of the consolidated enterprise. *In cases where such companies have no single line of activity or product which is dominant, the classification must necessarily be somewhat subjective.*

Parent and subsidiary registrants

To the degree that information is known, subsidiary registrants (other than railroads) included in the consolidated reports of the parent registrant are noted in a separate tabulation. [Emphasis supplied, except for subheadings emphasized in original.]

It is apparent from the data on seven "lines of business" supplied by LTV in its 1970 Form 10–K that the line it called "Meats and foods" was most important to it in the most recent full year, accounting for 36 percent of our company's consolidated sales and 149 percent of its consolidated operating income.

The "Alphabetical Listing of Companies" in the SEC *Directory* confirms our conclusion. We find for our company the following starkly simple listing:

Industry code, manufacturing, 20.1; nonmanufacturing; name, Ling-Temco-Vought Inc.; docket no. 1–4368.

Industry group 20.1, in the Enterprise Standard Industrial Classification (1968), is: "Meat products." However, that is a narrower classification than is used in the *QFR*, so we may begin to suspect that the consolidated operating results of Ling-Temco-Vought, Inc.—the great pharmaceutical and chemical manufacturer, defense contractor, aerospace giant, steel producer, electronics and electrical equipment manufacturer, and (at least for parts of the period 1969–early 1971) sporting goods manufacturer, rug manufacturer, wire and cable manufacturer, major domestic and international air carrier, operator directly or through subsidiaries of 757 establishments in 47 States, 29 foreign countries, D.C., Puerto Rico and Guam—were *all* classified "on consolidated basis" in the *QFR* issues appearing in 1969—early 1971 under the heading: "Industry code 20, Food and kindred products."

In the words of the SEC *Directory*, "somewhat subjective" indeed!

However, a little closer study of LTV's corporate structure and of the *Directory* leaves this suspicion something less than a firm conclusion. When interrogated on the subject, the responsible staff chief at the FTC refers the inquirer to the responsible staff chief at the SEC, and the latter declines to answer on the ground that the information requested is confidential. So we are left with such questions as these unsettled in our minds:

(Question 3–4.) The SEC *Directory* lists Jones & Laughlin Steel Corp. and Jones & Laughlin Industries, Inc. in the alphabetical and industry-classification sections, both companies being classified to manufacturing industry code 33.1, "Iron and Steel—blast furnaces, steel mills, and iron and steel foundries." Jones & Laughlin *Steel* (the Nation's sixth-largest steel producer) is *also* listed in the section headed "Subsidiary registrants included in the consolidated reports of parent registrants" opposite the name of Ling-Temco-Vought Inc., as "parent;" but Jones & Laughlin *Industries* (the subsidiary through which LTV in 1970 was controlling J&L Steel with 81 percent stock ownership) is *not* listed in that section. *Query*: In the *QFR*, are the operating results of J&L *Industries* (including its equity in the operations of J&L Steel) tabulated in the industry code 331, "Primary iron and steel," or in the industry code 20, "Food and kindred products," a major industry group that includes the industry group to which LTV itself is assigned in the *Directory*, 20.1, "Meat products"? What is the explanation for the inclusion of J&L Steel in and the exclusion of J&L Industries from the consolidated subsidiaries section of the SEC *Directory*?

(Questions 3–5.) The SEC *Directory's* alphabetical section lists the Okonite Co., separately and classifies it to manufacturing industry code 33.5, "Nonferrous metals—refining, rolling, drawing, forging and nonferrous foundries." But Okonite is also listed in the *Directory* section that would indicate its results to have been consolidated with those of LTV, its parent (in 1970, although not now). Okonite is the subsidiary responsible for the "wire and cable" and "floor covering" results in LTV's seven lines of business in its 1970 Form 10–K. *Query:* In the 1969–70 issues of *OFR*, were Okonite's results tabulated in *OFR's* industry code 33, "Primary metal industries," or in *OFR's* industry code 20, "Food and kindred products," in deferrence to the principle of consolidation with the "parent" LTV?

(Questions 3–6.) LTV Electrosystems, Inc., and LTV Ling Altec, the two other major subsidiaries primarily responsible for the results reported under the "Electronics" line of business in LTV's Form 10–K, are not listed at all in the alphabetical and industrial-classification sections of the SEC *Directory;* but both are included in the section listing subsidiary registrants consolidated with parents, LTV being named as the parent. The same applies to LTV Aerospace Corp., the sudsidiary responsible for LTV's 10–K reported results in the "Aerospace" line of business. *Query:* May we therefore assume that the results of these three giant electronic, aerospace and defense companies were all tabulated in the *OFR* industry "Food and kindred products"?

(Question 3–7.) The reverse situation applies, in the SEC *Directory*, to Braniff Airways, Inc., the subsidiary responsible for LTV's reported results in its "Air transportation" line of business. Braniff is listed in the main alphabetical and industry-classification sections of the *Directory*, classified to non-manufacturing industry code 45.0, "Air transportation." It is *not* listed in the subsidiaries consolidated with parents section. *Query*: May we safely assume that Braniff's results have been subtracted by LTV in the data it submits for the *QFR* and therefore were not included in the "Food and kindred products" totals in the *QFR*?

(Question 3–8.) Wilson Pharmaceutical & Chemical Corp. is listed in the main alphabetical and industrial-classification sections of the SEC *Directory*, assigned to manufacturing industry code 28.3, "Drugs." It is also listed in the subsidiaries consolidated with parents section of the directory, with LTV named as parent LTV does not even mention "Drugs" as a line of business in its Form 10–K. *Query:* in the *QFR*, are Wilson P&C's results carried under the *QFR* industry code 233, "Drugs," or (as we would surmise from the company's listing in the subsidiaries consolidated section) under its parent LTV's classification, "Food and kindred products"?

These are not trivial questions. The answers have significant implications for the quality of the statistical reporting by *QFR* of operating results in the industries it purports to tell us about. If we assume the worst possible answer to all these questions —that *all* of LTV's consolidated operating results have been tabulated in *QFR* in *one* industry, "Food and kindred products"—the *QFR* tables for that industry group would appear thereby to have been distorted in 1970 in a curious and substantial way. For LTV's consolidated *sales* in 1970 were almost three times larger than its sales of "Meat and foods," while its "Meat and foods" *income* was almost half again larger than its consolidated income! If *QFR's* "Food and kindred products" industry group incorporated data only for LTV's results in "Meat and foods," as reported in its annual reports, the LTV contributions to the totals in that group would have been income of about $11 million on sales of $1.5 billion—a return of 0.8 percent on sales. Instead, it seems at least possible that the LTV contributions tabulated in *QFR* could have been something closer to its consolidated total of $7.6 million of income on $4 billion of sales—a return of 0.2 percent on sales.

At this point, we may begin seriously to question not only whether the *QFR* helps us compare LTV with "the average performance of companies . . . in" the "Food and kindred products" line; we may wonder whether the numbers *QFR* has reported for that industry group for 1970 bear any great relationship to reality at all. (The *QFR* reported 1970 before-tax income of $4.8 billion on sales of $101.2 billion—a 4.7 percent return—in "Food and kindred products.")

In the same consolidation process, it seems possible-to-probable that data on several other industry groups reported in the *QFR* have been distorted to significant degrees.

For example, the *QFR* includes data on an industry group styled "Aircraft and parts;" but it seems quite likely that the *QFR* data for that industrial classification did not include LTV's results in "Aerospace." Again, this is no small matter. LTV's total "Aerospace" sales, as reported in its 1970 Form 10–K, were over $820 million, or more than 3 percent of the $25.5 billion national-total "Aircraft and parts" sales reported for 1970 in the *QFR*.

Distortions such as these do not occur solely as the result of consolidation of the operating results of the brash young conglomerates. The older corporate giants play the same game, with the *QFR's* aid and consent, and with effects equally or even more detrimental for any efforts at reliable economic and industrial analysis. It is increasingly treacherous to think of *any* giant corporation as other than a conglomerate.

General Motors, for example, through its Frigidaire Division, is a leading producer of electric refrigerators; but the Frigidaire Division's operating results are all consolidated, in the *OFR*, in industry code 371, "Motor vehicles and equipment," rather than being tabulated separately—as would seem more

sensible, desirable and truthful—in the *OFR* industry group styled "Electrical machinery, equipment and supplies." The inclusion in "Motor vehicles and equipment" of the operating results of GM's Allison Division, Defense Division and assorted divisions making locomotives and other heavy equipment surely must inflate that industry code significantly, while deflating in like degrees such other *OFR* industry codes as "Transportation equipment," "Aircraft and parts," "Other machinery," and "Miscellaneous manufacturing, and ordnance."

United States Steel, for another example, through its Universal Atlas Cement Division, is a leading producer of cement; but that division's operating results are all consolidated, in the *OFR*, in "Primary iron and steel." The *OFR* includes data on an industry group termed "Stone, clay and glass products," within which the data for Universal Atlas would seem to belong; but the principle of consolidated enterprise reporting precludes so elementary an application of economic commonsense and semantic and statistical honesty.

And the examples could be multiplied and multiplied, presumably to a point approximating the arithmetical product of the 31 industry groups covered in *OFR* times the number of giant corporations reporting to *OFR* that have multi-industry operations.

We may now add to our list of questions two that seem to go to the heart of the foregoing, more specific questions about LTV.

(Question 3–9.) Why should not, and why does not, the *OFR* obtain from the larger respondents to its quarterly questionnaires—say corporations with annual sales of $50 million or more—*separate* questionnaires for their operating results in *each* of the 31 industry groups that *OFR* reports, instead of a consolidated questionnaire that mixes, so to speak, industrial apples, oranges and roller skates?

(Question 3–10.) Why should not the individual contributions of giant corporations to the data tabulated in the *OFR* be made available to the public in a separate, supplemental publication, or in an appendix to the *OFR* itself?

Among those most concerned about the degradation of the *OFR* as a credible record of industrial performance are the members and staff of the FTC, which will soon bear sole responsibility for it. (After all, the agency *is* charged with protecting the public from false and misleading advertising!) In a later working paper in this series, which we hope will be ready before the hearings begin, we shall describe in some detail the efforts the Commission is making to improve this unsatisfactory situation, and the astonishing big-business resistance to those efforts.

—GAYORD NELSON and RAYMOND D. WATTS

FOOTNOTES

[1] Hearings before the Subcommittee on Monopoly of the Select Committee on Small Business, United States Senate, 91st Congress, 1st Session, *The Role of Giant Corporations in the American and World Economies*, Part 1, *Automobile Industry—1969*, July 9, 10 and 11, 1969, p. 98.

[2] Hearings before the Subcommittee on Antitrust and Monopoly of the Committee on the Judiciary, United States Senate, 91st Congress, 2d Session, *Economic Concentration*, Part 8, *The Conglomerate Merger Problem*, Nov. 4, 5, 6, 1969; Jan. 28, Feb. 5, 18 and 19, 1970, p. 4819.

[3] We reiterate that this is a *hypothetical* example. The subcommittee has not found any data, public or secret, on the profits or losses experienced by any company or all companies actually engaged in the manufacture of golf carts. The *1967 Census of Manufactures* reports that, in Product Code 37510 81, "Self-propelled golf carts (electric and gasoline powered) for carrying passengers and/or industrial in-plant personnel carriers," 1967 shipments amounted to $38,900 units valued at $36.3 million. The *Census of Manufacturers* contains no data whatever on manufacturing profits and losses, and little or no data beyond value of shipments and (sometimes) units of shipment of 7-digit products. Census reporting of detailed data stops with the 5-digit product and 4-digit industry levels of classification. The 4-digit industry that includes golf carts as one of its 7-digit products (six other 7-digit product classifications are also included) is styled "Motorcycles, bicycles and parts," Standard Industrial Classification (SIC) No. 3751. That industry in 1967 was made up of 91 establishments (plants) owned by 87 companies. Total shipments of primary industry products that year were valued at $262.6 million. The value of shipments of golf carts may thus be calculated as 14 percent of the value of shipments of all primary products of the industry in 1967. The *Census of Manufacturers* does not disclose how many of the 87 companies and 91 establishments classified in Industry 3751, "Motorcycles, bicycles and parts," were engaged in the manufacture of Product Code 37510 81, "Self-propelled golf carts, etc." And we are presently aware of no other source, governmental or private, from which the public generally could obtain that information, although there may be one, among trade associations. It is a safe bet that there is *no* source, open to the public, for finding out any single company's—and probably none for all companies'—profits or losses realized in the manufacture of golf carts.

[4] David Solomons, "Accounting Problems and Some Proposed Solutions," in Alfred Rappaport, Peter A. Firmin and Stephen A. Zeff (editors), *Public Reporting by Conglomerates*, Prentice-Hall, Inc., pp. 93–94.

[5] The application of Item 1(c) of SEC Form 10–K to Company A, and of Item 1(c)(1) to Company B, as stated in our hypothetical, reflect our understanding of the actual requirements of the amended form in the postulated situations. The further suggestions in the hypothetical, that SEC examiners might, in either case, have *read* the submission on Form 10–K and requested amplification or change, comes closer to the realm of pure fancy. We give much credence to rumors we have heard, that Forms 10–K are, by and large, stamped in with a "Received" stamp and promptly filed away, with no perusal at all or only the most hasty and casual skimming by the SEC's overburdened personnel in the Division of Corporation Finance. The latter have their hands full keeping up with the registration statements which, under their statutes and procedures, they *must* read and pass upon within a reasonably brief time after filing. However, members of the investing public could press the SEC to require amendments of Company A's Form 10–K, in the situation here hypothesized, with good chance of success, while Company B would be equally likely to succeed in resisting any public pressure for an amendment of its Form 10–K in this fact situation.

More detailed discussions of the requirements of the SEC for line-of-business reporting in registration-statement and annual-report forms will be included in future working papers in this series. See also footnote 8, below, and accompanying text.

[6] Paid circulation of the *OFR* is about 5,000, by subscription and single-copy sales, and another 2,000-plus copies are distributed free each quarter to government agencies and depository libraries. Source: Government Printing Office.

[7] Estimate by the staff of the Senate Small Business Committee. The *total* cost of *all* FTC statistical programs in 1969 was $559 million, while that of the SEC in the same year was $478 million: Subcommittee on Census and Statistics of the Committee on Post Office and Civil Service, House of Representatives, *1969 Report of Statistical Activities of the Federal Government*, H. Report No. 91–1085, 91st Congress, 2d Session (1970), p. 9. The *OFR*, we have been informed, accounts for the bulk of the total statistical-program costs incurred by the FTC but for only a relatively minor fraction of such costs incurred by the SEC. After 1971, as noted in the text, the entire responsibility for the *OFR* will reside in the FTC.

[8] Securities and Exchange Commission, Form 10–K as amended by Securities Exchange Act of 1934 Release No. 9000, Oct. 21, 1970 (effective Dec. 31, 1970). For an extensive compilation of documents and materials on changes in "line of business" reporting requirements at the SEC, see Hearings, *Role of Giant Corporations* (full citation in footnote 1, above), part 1A, appendix VII, pp. 75.–867. See also Alfred Rappaport and Eugene M. Lerner, *A Framework for Financial Reporting by Diversified Companies*, NAA Research Study (National Association of Accountants, 1969), Appendix A, "Background of Events and Issues for Financial Reporting by Diversified Companies," pp. 45–55.

[9] If you can't wait, you will find the beginnings of a reconciliation of the divergent numbers at page 6 of LTV's 1970 annual report, as quoted in: Staff Report by the staff of the Antitrust Subcommittee of the Committee on the Judiciary, House of Representatives, *Investigation of Conglomerate Mergers*, House Committee Print, 92nd Congress, 1st Session (June 1, 1970), p. 318. The staff report contains extensive and valuable discussion of and documents on LTV (pp. 316–359, 500–577), as well as other conglomerates.

[10] Federal Trade Commission—Securities and Exchange Commission, *Quarterly Financial Report for Manufacturing Corporations*, First Quarter 1971, pp. 3, 5.

[11] Unregistered corporations of course would not be included in the SEC *Directory*, and the FTC does not publish a directory of the corporations included in its portion of the sample of all manufacturing corporations on which the *QFR* tabulations are based. The *QFR* sample includes 100 percent of manufacturing corporations with assets of $10 million and over and descending percentages of corporations of smaller and smaller asset sizes. See heading, "Composition of the sample" at page 58 in the *QFR* for the First Quarter 1971.

ANNOUNCEMENT OF HEARING ON A BARRIER-FREE ENVIRONMENT FOR THE ELDERLY AND HANDICAPPED

Mr. BYRD of West Virginia. Mr. President, at the request of the distinguished Senator from Idaho (Mr. CHURCH), I have been asked to state that the Senate Special Committee on Aging will conduct hearings on a barrier-free environment for the elderly and the handicapped on October 18, 19, and 20 in room 1114, the New Senate Office Building, beginning at 10 a.m. each day.

Mr. President, I ask unanimous consent to have printed in the RECORD a statement by the Senator from Idaho with respect to that hearing.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

STATEMENT BY SENATOR CHURCH

Our purpose is to explore problems that arise for aged and handicapped persons because of architectural or other barriers which deprive them of access to structures and to transportation systems. We are especially interested in the adequacy of existing legislation in the face of (1) the likelihood of significant increases in the numbers of elderly Americans within the next few decades and

the probable increase in the number of handicapped persons, (2) the probability of accelerated construction of public facilities during the same period, and (3) the very complexity of metropolitan development and its effect upon the elderly and the handicapped.

NOTICE OF HEARING ON PROPOSED INDIAN TRUST COUNSEL AUTHORITY

Mr. BYRD of West Virginia. Mr. President, on behalf of the distinguished Senator from Washington (Mr. JACKSON) I ask unanimous consent to have printed in the RECORD an announcement of a hearing to be held by the Subcommittee on Indian Affairs of the Committee on Interior and Insular Affairs.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

STATEMENT BY SENATOR JACKSON

I wish to announce to the Senate, the Indian people and the general public that a two-day hearing has been scheduled on November 22 and 23 before the Subcommittee on Indian Affairs of the Interior and Insular Affairs Committee on S. 2035, to provide for the creation of the Indian Trust Counsel Authority, and for other purposes.

A similar measure (S. 4165) was introduced in the 91st Congress as part of the President's legislative package in support of the "Self-Determination Without Termination" policy as expressed in his July 8, 1970, Message to Congress on American Indians. Hearings were held on S. 4165 on September 21 and 25, 1970, before the Subcommittee on Indian Affairs, with no further action being taken on the measure in the last session of Congress.

Mr. President, no other group of citizens stand in precisely the same relationship to the Federal government as do the American Indians. Underlying this unique and long-standing relationship is a large and still growing body of treaties, agreements, executive orders, court decisions and laws. They provide the judicial basis and the historical background which supports the Federal relations of Indians.

Inherent in this relationship is the Federal government's special responsibility for the protection of Indian natural resources and rights. Because of intolerable conflicts of interest between the various departments and agencies within government who are charged by law with the responsibility of protecting the Indians' natural resources and rights, the Administration has proposed legislation for the creation of the Indian Trust Counsel Authority. In the most sweeping terms, the Counsel would serve as a legal advocate in behalf of the Indians to assure the fullest measure of judicial and administrative treatment by the Federal government in the protection of their natural resources and other rights.

The proposed legislation has many implications for the Federal government, the Indian people and the general public. I have, therefore, announced these hearing dates well in advance to permit all invited witnesses ample time to prepare for their testimony.

The hearings on both days will be open to the public and will commence at 10:00 a.m. in room 3110 of the New Senate Office Building.

NOTICE CONCERNING NOMINATION BEFORE THE COMMITTEE ON THE JUDICIARY

Mr. BYRD of West Virginia Mr. President, the following nomination has been referred to and is now pending before the Committee on the Judiciary:

Thomas E. Ferrandina, of New York, to be U.S. marshal, Southern District of New York, for the term of 4 years, vice Anthony R. Marasco, term expired.

On behalf of the Committee on the Judiciary, and at the request of the distinguished chairman thereof, notice is hereby given to all persons interested in this nomination to file with the committee, in writing, on or before Friday, October 22, 1971, any representations or objections they may wish to present concerning the above nomination, with a further statement whether it is their intention to appear at any hearing which may be scheduled.

ADDITIONAL STATEMENTS

PRESIDENT NIXON'S PEACE OFFENSIVE

Mr. FANNIN. Mr. President, I wonder if ever before in the history of the United States of America there has been such a peace offensive as we have witnessed in the last 2½ years.

President Nixon came into office with a promise that he would extricate American combat troops from Vietnam with honor. He has made tremendous progress in implementing this program.

He pronounced the "Nixon doctrine" for the Far East and Southeast Asia—reaffirming the determination of the United States to help our friends help themselves but disavowing any intentions of having our troops become embroiled in any further conflicts such as the Vietnam tragedy.

The Nixon administration has employed firm patience and master diplomacy in preventing the Mideast from becoming the trigger for world war III.

But this sterling record was not good enough for President Nixon.

Last July he stunned us with his announcement that he would go to Peking to talk with the leaders of mainland China.

Now we find that he also will go to Moscow to confer with the leaders of the Soviet Union. Hopefully, they will reach some agreement that will facilitate arms control and ease world tensions.

President Nixon is opening new lines of communications that can be instrumental in preventing catastrophic collisions between the superpowers in the future.

It is most encouraging that President Nixon has made it clear that these are, in a very real sense, peace conferences. These meetings are intended to increase the chances for peace rather than sow any new seeds of distrust.

First, he has made it clear that we will stand by our old allies. There will be no sellout of those brave nations that have been our friends while standing in the shadow of the two huge Communist countries.

Second, he gave assurances that the United States is not trying to play mainland China off against Soviet Russia, or vice versa.

These two historic journeys by the President cannot hurt the United States or our allies; these journeys can only help. The effort could contribute to a solution of the terrible mess in Southeast Asia and could help ease the volatile Mideast situation.

Recently, I polled my constituents on a number of important issues. I found that two out of three persons replying said they favored the President's planned trip to Peking.

It is not that Arizonans are not skeptical about the trips. Even those supporting the President's plan to go to Peking advised that great caution be exercised in any talks with Communist leaders. I found that most Arizonans have great confidence in the President's judgment and ability to deal with the Communist leaders—and I share this confidence.

Mr. President, there is some skepticism, of course. One of my constituents, commenting on the President's trip to Peking, wrote to me:

A visit with those shady characters will give our President a better insight into what we're up against.

Mr. President, I am more optimistic than that. I think President Nixon has made some great peace initiatives that forcefully demonstrate to the world that the United States wants peace and is willing to work to keep it.

In closing I would like to cite the old saying: "Nothing ventured, nothing gained."

ECONOMY AND THE CONGRESS

Mr. ELLENDER. Mr. President, yesterday the Wall Street Journal published an editorial on the subject of economy in government. The Journal's editors moved from a description of an experience of the National Aeronautics and Space Administration in its operation of Cape Kennedy to a broader principle affecting the Congress and the Government.

It seems that because NASA was faced with budget cutbacks, the administrator of that Government facility looked around to see where a few dollars of Government expenditures might be saved. Accordingly, a few lights were turned off at Cape Kennedy with the result that an annual saving of $75,000 will be realized. It is reported that everything is continuing to function.

The Journal continues with the comment that—

It is possible that the entire Government could further multiply the savings if it were put under some real pressure to do so from Congress.

The point is also made that when a householder gets into trouble someone else—notably the electric company—will turn out his lights if he is unable to effect the necessary economy.

As chairman of the Committee on Appropriations, I can assure the Senate that I am doing everything possible to help supply the internal discipline that is so often found to be lacking in our government. As such, of course, I will need the assistance of all Senators and, for that matter, the assistance of the Executive and all Members of Congress. I have instructed the staff of the Appropriations Committee to go over each of the budgets for which they are responsible and report to me areas where large or small savings could be effected. The process has just begun, but I believe it

will be effective and Senators may rest assured that it will continue.

The Nation has come to the point where the discipline that is apparently lacking internally may have to be supplied from outside sources. I refer to our friends abroad. Notwithstanding the stupendous largess that we have made available over the last quarter century, many of them seem to be intent upon pressing whatever economic advantage they feel they now have over the United States.

A story now making the rounds is that at one time we thought it was our children that did not know the value of the dollar. Now it seems to be the Japanese, the Germans, the French, and others who do not know that value. Conversely, given our policies over recent years, perhaps they know it only too well. I think those policies are being reversed. The current administration is moving in the right direction, and the Senate may rest assured that I will give all possible assistance in my capacity as chairman of the Senate Appropriations Committee.

Mr. President, I ask unanimous consent that the editorial entitled "Economizing," published in the Wall Street Journal of October 14, 1971, be printed in the RECORD.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

ECONOMIZING

One of the first things that occurs to householders when a money pinch comes is to turn off all the unneeded lights to save some money on electricity.

The same thought occurred to National Aeronautics and Space Administration officials at Cape Kennedy when they faced budget cutbacks. And they came up with a real enough saving, an estimated $75,000 a year. The Cape Kennedy NASA parking lots and some buildings are a little dimmer but everything continues to function.

Cape Kennedy is a large, expensive facility, so it is not surprising that one small effort to economize would have a payoff. NASA could probably find any number of other possibilities if it looked around a bit and they might add up to a saving that would be significant even in comparison to the huge space budget.

It also is possible that the entire government could further multiply the savings if it were put under some real pressure to do so from Congress. Unfortunately, it isn't under much pressure and Congress isn't showing much inclination to supply more. One of the signs that a householder is in serious financial trouble is when someone else, the electric company, turns out his lights. Maybe that will have to happen on Capitol Hill before Congress realizes that there must be an end some day to ever-rising federal deficits.

ENVIRONMENTAL CONCERNS OF STATE OF OREGON

Mr. PACKWOOD. Mr. President, I invite the attention of Senators, once again, to the leadership the State of Oregon has taken in the area of environmental concerns.

On October 1, 1971, an old friend of mine, and of all Oregonians, L. B. Day, stepped into the shoes of what might well be termed the hardest shoes of all to wear. Governor McCall has called upon L. B. to serve as his director of the Department of Environmental Quality. And a splendid appointment it is.

I have had the pleasant experience of counting L. B. Day among my close friends since we served in the Oregon Legislature together. It was there that I learned to respect his skillful abilities during difficult times. He is certainly not one who leaves the kitchen when it gets too hot.

Mr. President, I could say much more about the fine qualifications of this man for this difficult task he has assumed, but I think I would rather share with the Senate the article written by Jerry Uhrhammer, of the Eugene Register-Guard. I ask unanimous consent that the article be printed at this point in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

[From the Eugene (Oreg.) Register-Guard, Sept. 26, 1971]

DAY TO SEEK BROADER CONCERNS FOR DEQ

(By Jerry Uhrhammer)

Those who are on a first-name basis with L. B. Day don't use his first name. They just call him "L.B." The reason is rather simple. While L. B. could stand for Lawrence Benjamin or Lancelot Browning, the initials really stand for nothing at all.

"I have no first and second names . . . just the initials," said the 39-year-old Day, onetime Oregon state representative from Salem who, after two years as regional representative for the Interior Department, was recently named new director of the state Department of Environmental Quality.

Day is used to people having only initials where most folks have given names. It's practically hereditary in the Day family. His father was named L. B. So was his grandfather. It goes several generations back, he says, to when the Day family lived in the South, where initials—only names are common.

(Day explains that the custom is believed to have started when parents gave biblical names to their sons, and the younger generation of that day—unhappy with being saddled with such names as Ezekiel, Leviticus or Job—started going by their initials instead. Pretty soon the parents started shortcutting the process by just bestowing initials at the outset.)

In any event, the initials L. B. may likely become familiar to environmentally conscious citizens of this environmentally conscious state.

Day's appointment as DEQ director apparently signals a more activist role for the agency that is responsible for, among other things, the quality of Oregon's water and air.

This suggestion came across in a recent interview at Astoria, where Day was attending a meeting of the state Environmental Quality Commission.

It was Gov. Tom McCall who "took an interest" and offered him the job, Day related.

Wouldn't it then be a good assumption that—with such an "interest"—the governor had something he wanted done?

Yes, agreed Day. "I think the governor and I are both pragmatists about approaches to environmental considerations, and I think he would like to see leadership on a broader spectrum from what the DEQ has done in the past.

"And I don't mean to demean it, because if you look at the DEQ's record in Oregon, versus any other state in the country, nobody can touch it. The staff is excellent . . . quality, dedicated people . . . and they've been understaffed. . . .

"But I think the governor would like to see broader concerns on environmental factors brought to bear. Not just on water, air, solid waste or the automobile, but really address ourselves to the quality of life. Regardless of whether we many or may not have primary jurisdiction in an area, we still have a responsibility to comment on it."

Day expanded on the role he sees of a DEQ that does more than just performing its basic regulatory functions: "A number of environmental problems just don't happen overnight. I think they crop up and they fester, and I think there are a number of things you can do to be ahead of them. . . .

"We might have an obligation to identify environmental hazards that are coming forth. Even though you may not have total authority to correct them, you at least have a duty to identify them and maybe seek legislation," he went on.

Day's appointment as DEQ administrator was endorsed by Larry Williams, executive director of the Oregon Environmental Council, who said Day had proven himself as an "able conservationist" as regional director for the Interior Department.

Day—tall, angular and graying—handles the conservationist tag more gingerly.

"I don't know whether I am or not," he said with a smile, "but if the definition is for one who would like to keep the water clean and the air we breathe livable and to be enjoyed, that's what I want. I want progress, but progress doesn't mean we have to be wasteful or throw things in the water."

In the DEQ, Day will be taking over what a governor's aide called the fastest growing department in the state government. Not only did the Legislature expand the DEQ's areas of responsibility, but also increased the department's budget, a good part of it for boosts in manpower.

Kessler Cannon, McCall's assistant for natural resources, said the DEQ's personnel quota is increasing from 62 to 118. Part of this will be in administration, because until his year the DEQ's administrative services came under the State Board of Health.

Day's appointment is viewed by some as a move to add more administrative strength to the growing department. One Capitol source described him as a perceptive man with excellent management abilities, tremendous drive and a knowledge of how government ticks.

Day grew up in Nebraska and didn't come to Oregon until his discharge from the Navy following the Korean War. He finished his schooling at Williamette University and went into labor relations, working 16 years for the Teamsters. He was a Democrat, then switched to the Republican party and was elected to three terms in the Legislature, attaining a seat on the powerful state Ways and Means Committee, before being appointed to the Interior post by former Sec. Walter J. Hickel. He also was named Salem's "First Citizen."

Day and his wife (who runs an antique shop) and their 8-year-old son live in Salem. He commutes to his office in Portland, and—for the time being, until Oct. 1 or his successor as Interior regional representative is appointed—is also "commuting" between the Interior and DEQ offices.

How would he describe himself?

Day answered: "I like action. I like to be in and work in areas which are controversial and that have problems that need to be solved. And I'm not afraid to give the answer."

In looking at the environmental problems the state faces, Day ranks as most challenging and most immediate the questions of solid waste and recycling.

He feels it will become not only an economic advantage, but also economic necessity to recycle. "In a nation with 4 or 5 per cent of the world's population that uses 53 per cent of the natural resources, obviously we aren't going to be able to sustain that kind of pace," he said.

It will take money and research, he con-

tinued, but most of all it will take an understanding population on such things as the segregation of wastes, the fact that there is value in it, and the fact that the public can't demand the variety of packages that contribute to solid wastes.

"Environmental laws are just like traffic laws. Everyone's for them and they're just great until they get pinched. Then they don't like it," he smiled. But individual habits will need re-evaluation, he added.

He ranks air quality close behind on the list of importance.

And he points his finger directly at the automobile.

"You shouldn't say air pollution is just from field burning," he said. "It's a funny thing . . . you can fly up the Columbia Gorge on a Saturday or Sunday at about 3,000 feet. And to follow the freeway you don't even have to look down. You just go above the pall of carbon monoxide. And downtown Portland . . . all that smoke and stuff isn't coming from a cereal mill. It's coming from the automobile."

Another important area, he said, will be planning commissions and their regulations for the use of water and land.

Day credits environmental groups and young people for making people aware of what's at stake.

"You can pooh-pooh the environmental groups," he said, "but I think they've done a real service. That chafing has been good. And the young people I think are fabulous. They've really made us start to sense our priorities. The same thing the kids started saying four years ago the adults are finally saying today.

"It's the young people who cared and wanted priorities changed. Like my son, who asked me a couple of years ago when we were riding along the Willamette River. 'Dad, why do we put dirty things in the water?' How do you answer that? Why do we put dirty things in the water? Why do we put dirty things in the air?

"The point is, it's cheaper to do it, I guess. And maybe it's also the laziest way."

Mr. PACKWOOD. Mr. President, I offer to L. B. Day my warmest wishes as he pursues his duties in this new position, and I also commend Governor McCall for such an excellent appontment.

AN ARTICLE FROM A GREEK PRISON

Mr. PELL. Mr. President, the current issue of Atlantic Monthly contains a moving article written by George Mangakis from a Greek prison.

I commend the article to the Senate as it indicates the suffering that men undergo in Greece because of their political beliefs, and it gives us a tremendous sensitivity of the seriousness of the problems facing the freedom-loving Greek people as they seek to live their lives under the present arbitrary and often cruel junta.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

[From the Atlantic Magazine, Oct. 1971]

LETTER IN A BOTTLE FROM A GREEK PRISON

(By George Mangakis)

(NOTE.—The author was unanimously elected to the Chair of Penal Law at Athens University at the age of forty-six in 1969. The Greek junta vetoed his appointment, and he was arrested in July, 1969, tortured, and tried the next year on charges of plotting to overthrow the regime and the existing "social order." Professor Mangakis was sentenced to eighteen years' imprisonment, and he remains in jail. His wife was also jailed for eleven months, charged with falsely telling foreign newspaper correspondents that her husband was being brutally tortured. She was later released.)

The dimensions of my cell are approximately 10 feet by 10 feet. You gradually become accustomed to this space, and even grow to like it, since, in a way, it is like a lair in which you lie hidden, licking your wounds. But in reality, its object is to annihilate you. On one side of it there is a heavy iron door, with a little round hole in the upper part. Prisoners hate this little hole; they call it the "stool pigeon." It is through this hole that the jailkeeper's eye appears every now and then—an isolated eye, without a face. There is also a peculiar lock, on the outside only; it locks with a dry, double sound. That is one thing you never get used to, no matter how much time goes by. It gives you the daily, tangible sensation of the violence that is being done to you. Before I came here, I didn't know that violence could be expressed so completely by the dry sound of a double lock.

On the other side of my cell there is a little window, with bars. From this window you can see part of the city. And yet a prisoner rarely looks out the window. It is too painful. The prisoner, of course, has a picture of life outside the prison constantly in his mind. But it is dim, colorless, like an old photograph; it is soft and shapeless. It is bearable. So you don't dare look out the window. Its only use is to bring you some light. That is something I have studied very carefully. I have learned all the possible shades of light. I can distinguish the light that comes just before daybreak, and the light that lingers on after nightfall. This light, with its many variations, is one of the chief joys of the prisoner. It often happens that a certain shade of light coincides with your mood, with the spiritual needs of that particular moment. Looking at the light, there have been times when I hummed a song, and times when I found it relieved pain. So much, then, for the window.

Apart from the door and the window, my cell also has a temperature. This is another fundamental element of my life here. It is unbearably cold in winter and extremely hot in summer. I find this natural, even though it brings me great discomfort. It is a symptom of the denudation of being in prison. Under such conditions, it has got to be like this; you just have to live in direct contact with the temperature of this particular world.

I live in this space, then, for endless hours of the day and night. It is like a piece of thread on which my days are strung and fall away, lifeless. This space can also be compared to a wrestling ring. Here a man struggles alone with the evil of the world.

I write these papers, and then I hide them. They let you write, but every so often they search your cell and take away your writings. They look them over, and after some time they return the ones which are considered permissible. You take them back, and suddenly you loathe them. This system is a diabolical device for annihilating your own soul. They want to make you see your thoughts through their eyes and control them yourself, from their point of view. It is like having a nail pushed into your mind, dislocating it. Against this method, which is meant to open up breaches in our defenses and split up our personality, there are two means of defense. First, we allow our jailkeepers to take away *some* of our writings—the ones that express our views unequivocally. It is a way of provoking the jailkeepers. We even derive a sort of childish satisfaction from thinking of the faces they'll make as they read. Then there are other papers which we prefer to hide—the ones we want to keep for ourselves.

My mind often goes back to the dead I have known and loved. In the vacuum of my cell, only concepts have substance. My cell is like a bottomless hole in the void. My most frequent visitor is my brother Yannis—he comes to me almost every day. He was killed in the war, but not in the act of killing others; he was a doctor. His regiment was afflicted with an epidemic of meningitis. He did not have time to cure himself. I have never been able to accept his death. I have simply managed, in time, to become reconciled to his absence. Now we are once again very close to each other. He has smiling, honey-colored eyes. He stays on for hours, and we sit there and think together. It used to be the same when he was alive. Now he often makes me think that the value of charity cannot be put into question. That is one thing which cannot be put into question, especially now that I have come to know torturers, jailkeepers, and their masters at close quarters. I know how utterly the bestiality of absolute power has degraded them. It seems that, spiritually speaking, everything stems from charity. Yannis is quite positive about that. And also courage, and love for certain concepts relevant to man, and receptivity to beauty. Everything stems from there. Sometimes Yannis gets up and takes those three paces forward, then backward, on my behalf. Then I can see his strong, graceful body. In the old days he used to like sailing. Now, as he paces across my cell, he brings the sea and the wind into my flat, barren cell. As he lifts his arm, he even gives the cell a perspective in depth. The kind of depth we keep looking for, he and I. Then he begins to think to the sound of music. He always loved music. And so my cell gradually fills with music. And I sail through the hours of the night in a sea of music. Those are my most serene nights, the ones suffused with a certain intimation of the meaning of the world. Yannis still remains a human being. If he is dead, then I am dead too. I believe we are both still alive.

There are moments when I sit in my cell thinking of what would be the best way to summarize my motives, those that made me end up in this cell and those that make me endure it. These motives are certainly not a belief in a single truth—not because we no longer have any truths to believe in but because, in our world, we do not experience these truths as absolute certainties. We are no longer as simple as that; we seek something more profound than certainty, something more substantial, something that is naturally, spontaneously simple. I think, then, that the totality of my motives in this connection could best be epitomized as hope—in other words, the most fragile, but also the most spontaneous and tenacious form of human thought. A deeply rooted, indestructible hope, then, carved out the path that was to lead me, unrepentant, to this barren desert, and it is the same hope that makes me capable of enduring it, like those small, tormented desert plants which contain, inexplicably, two tiny drops of sap—drawn, I am sure, from their own substance. My hope is the equivalent of those two drops of sap. However, the intensity of my hope is equal to my difficulty in putting it into words. I might say, perhaps, that this hope concerns our humanity, which cannot be annihilated no matter how much it is persecuted on all sides; this is why there can be no purpose as serious, as noble, as to commit ourselves to its safeguard, even if we must inevitably suffer for it.

Yet I don't think that by saying this I am expressing myself as concretely as I would wish. This hope takes shape only in certain attitudes. During the past months, through all the prisons I've known, I have often come across these attitudes. When I was held at the police-station jails—those places of utter human degradation—I remember a girl who was locked in a cell next to mine. She had been there for five months. She hadn't seen

the light of day once throughout that period. She had been accused of helping her fiancé to do Resistance work. At regular intervals, they would summon her for questioning and would try to make her disown him, using cunning persuasion or brutal intimidation alternately. If she disowned her fiancé, she would be set free. She refused unflinchingly, to the very end, even though she knew that her fiancé was dying of cancer and she would probably never see him again. He died on the day of her trial. She was a pale, frail girl, with a kind of nobility about her. Every evening she used to sing in her cell in a soft, low voice. She would sing till dawn about her love, in her sad voice. The girl's attitude is my hope. And so is the attitude of the doctor whom they tried to involve in our case. There was no evidence against him. If he had adopted a noncommittal attitude at the court-martial he would certainly have been acquitted. But he was made of different mettle. When his turn came to take the stand at the trial, he got up and spoke about liberty. He defended liberty, even though he had a wife and children to support. He was sentenced to seven years in prison. This doctor's attitude is my hope. I have lived through a number of similar experiences. What I would like to say here is quite simply this: in the attitude of people like that doctor and that girl, the dominant feeling is a spontaneous knowledge that the most important thing in life is to keep one's humanity. Because life does not belong to the barbarians, even when absolute authority does belong to them. Life belongs to human beings, life goes forward because of them. This is the source of my hope.

I live with a number of ideas that I love. They fill my days and my nights. To the treacherous uniformity of my stagnant hours, I oppose this dialogue with my ideas. Now I have come to know them better and to understand them better. I have actually experienced their significance. When I was being questioned, I discovered the essence of human dignity, in both its deepest and its simplest sense. When I was court-martialed I hungered for justice, and when I was imprisoned I thirsted for humanity. The brutal oppression which is now stifling my country has taught me a great deal, among other things the value of refusing to submit. As I sit in my cell thinking about these things, I am filled with a strange power—a power which has nothing in common with the power in my jailkeepers. It is not expressed in a loud, insolent voice. It is the power of endurance—the power that is born of a sense of being right. That is how I face the relentless attack of empty days which has been launched against me. Each time, I repulse the attack at its very start. I begin my day by uttering the word "freedom." This usually happens at daybreak. I emerge from sleep, always feeling bitterly surprised to find myself in prison, as on the first day. Then I utter my beloved word, before the sense of being in prison has time to overpower me. This single word works like magic. And then I am reconciled to the new, empty day stretching ahead of me.

I think of my companions. The political prisoners I have come across in my various prisons. The ones who resisted and are now pacing across their cells, taking those three little jerky steps forward, then backward. They are all made of the same stuff, even though they may be very different persons in other respects. They all possess a very rare sensitivity of conscience. A truly unbelievable sensitivity. It becomes manifest in tiny details, as well as on big occasions. When they speak, they exercise the utmost delicacy with regard to the other person's feelings. They are always at your side with a glass of water, before you have time to ask for it. I want to give an example of this extraordinary sensitivity. Some days ago, one of us was about to be released. He was in the prison hospital. He could have left directly from there, but he delayed his departure for a week, so as to come and say good-bye to us. Seven days of voluntary prison just to say good-bye to his friends. That is what I mean. These people, then, have truly taken upon themselves the entire predicament of our times. They are consciously carrying the burden of our people's trampled honor. And in so doing they feel close to all those who are persecuted on earth. Through a fundamental unity they grasp the meaning of all that is happening in the world today. It is the unity of man's yearning to be free of oppression, no matter in what form. Whoever resists oppression is a brother to them, no matter who or where he is, scattered in the innumerable prisons of my own and other countries.

I often ask myself what it was exactly that touched our consciences in such a way as to give us all an imperatively personal motive for opposing the dictatorship and enlisting in the Resistance, putting aside all other personal obligations and pursuits. One does not enlist in the Resistance—in that mortally dangerous confrontation with the all-powerful persecution mechanism of a dictatorship, where the chances of being caught are far greater than the chances of getting away with it, where arrest will result in the most unbearable and long-term suffering—one doesn't get involved in all this without some very strong personal motive. So strong, in fact, that it must literally affect the very roots of one's being—since it makes one decide to risk falling into the clutches of the most appalling arbitrariness and barbarism, being reduced from a human being to an object, a mere receptacle of suffering, jeopardizing all the achievements and dreams of a lifetime and plunging loved ones into the most terrible agonies and deprivations.

I keep thinking, then, that this motive can be no other than the deep humiliation which the dictatorship represents for you, both as an individual and as a member of the people to whom you belong. When a dictatorship is imposed on your country, the very first thing you feel, the very first day, is humiliation. You are being deprived of the right to consider yourself worthy of responsibility for your own life and destiny. This feeling of humiliation grows day by day as a result of the oppressors' unceasing effort to force your mind to accept all the vulgarity which makes up the abortive mental world of dictators. You feel as if your reason and your human status were being deeply insulted every day. And then comes the attempt to impose on you, by fear, acceptance of their various barbarous actions—both those that you hear about and those that you actually see them commit against your fellow human beings. You begin to live with the daily humiliation of fear, and you begin to loathe yourself. And then, deeply wounded in your conscience as a citizen, you begin to feel a solidarity with the people to whom you belong. With a unique immediacy, you feel indivisibly bound to them and jointly responsible for their future fate. Thanks to this process of identification, you acquire an extraordinary historical acuity of vision, such as you had never known before, and you can see with total clarity that humiliated nations are inevitably led either to a lethal decadence, a moral and spiritual withering, or to a passion for revenge, which results in bloodshed and upheaval. A humiliated people either take their revenge or die a moral and spiritual death. Once you realize, then, the inevitability of your people's destruction, one way or another, your personal humiliation is turned into a sense of responsibility, and you don't simply join the Resistance, you become deeply committed to the Resistance. In other words, you situate the meaning of your existence in this strangest, this most dangerous and unselfish of all struggles which is called Resistance. From that point onward, may God have mercy on you.

Morally speaking, the Resistance is the purest of all struggles. As a rule, you join it only to follow the dictates of your consciences; it affords no other satisfaction except the justification of your conscience. Not only is there no benefit to be expected from this struggle but, on the contrary, you are endangering, or rather you are exposing to a near certain catastrophe, whatever you may have achieved until now with your labors, and you enter a way of life that is full of anxiety and peril. You cannot expect immediate praise, because you have to act secretly, in darkness and silence; nor can you expect future praise, because under a dictatorship the future is always uncertain and confused. There is only your conscience to justify you, as you see it mirrored at times in the eyes of one of your companions. Yet this justification counts more than anything else. You are privileged to experience certain moments in which you feel that you too express the dignity of the human species. This is the deepest justification a man may feel for being alive. This is why the Resistance is the worthiest of all struggles: it is the most dramatic manifestation of the human conscience.

A lot of people don't understand us at all. It seems that it is difficult to understand an act, that is motivated exclusively by the dictates of one's conscience, especially when the consequences of the act lead one to extreme situations. Our life is now based on values alone, not on interests. We have voluntarily placed ourselves in a position of unbearable suffering, and our main concern every day is not just to safeguard our humanity within this suffering but to transmute this suffering into a component of our humanity. Upon our suffering we try to build a personality that excludes ordinary joys, the pursuit of happiness, and that is purely conceptual. We have become incarnated concepts. This means we do not live in the present. Besides, we have no days that we can call the present, except perhaps the days when our loved ones visit us. Then, yes, for about ten minutes, for as long as the visit lasts, we feel once again the happiness and pain that the love of another human being can bring; we rediscover in this way common human interests, the need for joy, the revulsion from suffering. But apart from these occasions, we live timelessly. We exist as a result of the justification of our conscience, and for its sake alone. Thus there is no such thing as time for us. In this sense we could reach the absolute, if it weren't for the necessity to conquer this justification every day again from the very beginning. For this incarnation of abstract concepts is by no means a static condition; we still have blood in our veins, blood that pulsates with needs and desires, hearts that insist on dreaming, memories that ruminate on past happiness. We have our personal loves, for certain particular people. That is a constant threat to us. It means we have to struggle with ourselves in order to retain our conceptual condition, to balance ourselves upon the magnetic needle of conscience in its ceaseless quivering. Because of this constant effort, we are not absolute beings. Because of this effort, we are not yet dead.

Another thing: we feel very European. This feeling does not derive primarily from political opinions, even though it does end up by becoming a fundamental political stand. It is a feeling that grows out of the immediacy and the intensity that our cultural values have acquired under dictatorship. Fortunately, these values, which have become our whole life and which help us to endure our long nights and days, are not exclusively ours. We share them with all the peoples of Europe. Or rather the European people, for Europe is one single people. Here in prison we can affirm this with complete seriousness. Suffering helps us to get down to the essence of things and to express it with perfect simplicity. We see only the deeper

meaning of Europe, not the foolish borders, the petty rivalries, the unfounded fears and reservations. We see ourselves simply as one people, as a whole. It may seem strange—though only at first glance—how intensely the Greeks felt they were Europeans the very first day of the dictatorship. Our values are the values of Europe. We created them together. We felt instinctively, at the time, that nobody but a European could understand the tragedy that was taking place in our country and feel about it the way we did. And we were right.

We turned in despair to Europe, and the people of Europe did not forsake us. Now all those of us who have entered upon this ordeal, in the prisons of the dictatorship, say "Europe" as we would say "our country." And we mean exactly that: this fusion, in depth, of common historical experiences, cultural values, and human solidarity which we call "country," "fatherland." We clutch the bars of our narrow windows, we look at the world outside, and we think of those millions of people walking the streets, and we know that if they could see us, they would raise their hands in greeting, they would give us a sign. In those moments, with our mind's eye, we embrace the whole of Europe. It is a place which includes all our own people, all the ones who would raise their hands in greeting. The headhunters have locked us up in this narrow place in order to make us shrink, like those hideous human scalps which are their trophies. But what they haven't realized is that our country has widened; it has become a whole continent. They have isolated us so as to turn us into solitary, forsaken creatures, lost in a purely individual fate. But we now live in the immense human community of European solidarity. Their power is helpless in the face of this knowledge.

We often talk about the dignity of man. It is not an abstraction; it is a thing which I have actually experienced. It exists in our very depths, like a sensitive steel spring. It has absolutely nothing to do with personal dignity. Its roots lie much deeper. Throughout the nightmare of the interrogation sessions, I lost my personal dignity; it was replaced by pure suffering. But human dignity was within me, without my knowing it. There came a moment when they touched it; the questioning had already been going on for sometime. They cannot tell when this moment comes, and so they cannot plan their course accordingly. It functioned suddenly, like a hidden spring that made my scattered spiritual parts jerk upright, all of a piece. It wasn't really me who rose to my feet then, it was Everyman. The moment I began to feel this, I began to overcome the questioning ordeal. The effort was not longer only for myself. It was for all of us. Together we stood our ground.

I have experienced the fate of a victim. I have seen the torturer's face at close quarters. It was in a worse condition than my own bleeding, livid face. The torturer's face was distorted by a kind of twitching that had nothing human about it. He was in such a state of tension that he had an expression very similar to those we see on Chinese masks; I am not exaggerating. It is not an easy thing to torture people. It requires inner participation. In this situation, I turned out to be the lucky one. I was humiliated. I did not humiliate others. I was simply bearing a profoundly unhappy humanity in my aching entrails. Whereas the men who humiliate you must first humiliate the notion of humanity within themselves. Never mind if they strut around in their uniforms, swollen with the knowledge that they can control the suffering, sleeplessness, hunger, and despair of their fellow human beings, intoxicated with the power in their hands. Their intoxication is nothing other than the degradation of humanity. The ultimate degradation. They have had to pay very dearly for my torments. I wasn't the one in the worst position. I was simply a man who moaned because he was in great pain. I prefer that. At this moment I am deprived of the joy of seeing children going to school or playing in the parks. Whereas they have to look their own children in the face. It is their own humiliation that I cannot forgive the dictators.

One of the very few things I have been able to keep here is a picture of Erasmus. It's a newspaper clipping. I cut it out some time ago, and now I often look at it. It gives me a certain sense of peace. I suppose there must be some explanation for this. But I'm not interested in explanations. It is enough that there is this magic, this strange exaltation caused by the identification of this man with our own values, this victory over my solitude, which started centuries ago and which becomes real again as I look at his face. He is shown in profile. I like that. He is not looking at me, but he is telling me where to look. He reveals a solidarity of vision between us. In prison, this solidarity is a daily necessity, like the need for water, bread, sleep. When they search my cell they come upon Erasmus' picture, but they let me keep it. They don't understand. They've no idea how dangerous a mild, wise man can be. Sometimes I wonder about the jailkeeper's eye, watching me through the hole in the door—where does *he* find solidarity of vision?

Our position as prisoners has many distinguishing features. One of them is that we sing, quite frequently. It may sound strange to people who don't know about prisons. But that's the way it is—and come to think of it, it is very natural. Singing is part of the unwritten instructions passed on by veteran prisoners to newly arrived ones; when the pain and anguish are too much for you, sing. We begin to sing precisely when the anguish becomes unbearable. On days that are free of anguish, we don't sing. Singing seems to melt away that crushing burden we carry, just when we think we can no longer carry it; and then it rises out of us like an invisible gray mist. We feel a kind of relief. They know this, and that is why in some prisons, the harshest ones, singing is forbidden. I often sing in my cell, or I whistle. Sometimes I sing to my wife. If she could hear me, she would be pleased, even though I sing false. She knows about singing in prison she's been through it. In this place singing is a real, immediate need of the spirit. It is the daily bread of those who are struggling not to go insane. If softens up a harsh world and opens up the saving grace of new, wider vistas. As you sing, you feel you are traveling along these extended frontiers of the world. After all, we have our little trips too. I've got to say this: I'm grateful to songwriters, especially those who have composed sad songs. I like singing Mikis Theodorakis, for instance. In his old songs, it's as if he had a kind of foreknowledge of the prisons he was fated to live in. So we sing. I have never heard my jailkeepers singing. Most of their time they are busy digesting their food.

We are shut away in our individual cells. In one respect we are the most helpless of creatures. They can do what they like with us. Just as we are sitting in our cell, they march in, they take us away, we don't know where, to some other prison, far away. If it weren't for their strange fear of us, I might say that they look upon us as objects. But this fear of theirs keeps our human status intact, even in their eyes. Now these helpless creatures think of nothing else but the fate of mankind. When we are taken out of our cells and meet our fellow prisoners, that is what we talk about. That is our sole concern. Like so many others, we know the weaning of this yearning for freedom that is pulsating throughout the world. And we can discern, more clearly than ever before, the enemies of freedom. We tremble for the fate of this great country which we call Europe. We know that hope hangs upon Europe, and that is the reason why it is constantly threatened. It is very dangerous to nourish the hopes of mankind. Why else should Greece have become enslaved? They built another bridgehead next to those of Spain and Portugal. They are afraid of Europe—that long-suffering fountainhead of ideas, that inexhaustible breeding ground whose ancient soil has never ceased to shelter the seeds of thinking. The simple citizens of Europe nurture these seeds, keeping them alive thanks to the restless, questing spirit which is so much a part of their being. The wealthy and the powerful are quite right to fear it. In this place, when we talk about "man," we know what we mean. We mean the quality which makes him the measure of all things. That is our oldest, our wisest, our most explosive concept. It is because of this concept that they fear Europe. We know that someday, inevitably, Europe will play her role. That is why we tremble for Europe's fate today. That is why Europe is the sole concern of people like us—the most helpless of creatures.

It has all become quite clear to me. It had to be this way. From the moment my country was humiliated, debased, it was inevitable that I should go underground. It was an inexorable spiritual imperative. My whole life had been leading me to that imperative. Since childhood, I was taught to gaze upon open horizons, to love the human face, to respect human problems, to honor free attitudes. At the time of the Second World War, I was an adolescent; I lived through the Resistance; it left its moral mark on me. Only I didn't know at the time how deep that mark was. It has now become clear that it was to be the most vital inspiration force in my life. At last I can explain many things that happened to me between then and now. And so when the dictatorship came, I was already committed to the Resistance, without knowing it. I was carrying my own fate within me. Nothing happened by chance, by coincidence. Only the details were accidental. Diabolically accidental. But the general direction, the orientation, was rooted securely within me. Therefore it is not by mistake that I now find myself in prison. It is quite right that I should be here. What is horribly wrong is that this prison should exist at all.

I would like to write about a friendship I formed the autumn before last. I think it has some significance. It shows the solidarity that can be forged between unhappy creatures. I had been kept in solitary confinement for four months. I hadn't seen a soul throughout that period. Only uniforms—inquisitors and jailkeepers. One day, I noticed three mosquitoes in my cell. They were struggling hard to resist the cold that was just beginning. In the daytime they slept on the wall. At night they would come buzzing over me. In the beginning, they exasperated me. But fortunately I soon understood. I too was struggling hard to live through the cold spell. What were they asking from me? Something unimportant. A drop of blood—it would save them. I couldn't refuse. At nightfall I would bare my arm and wait for them. After some days they got used to me and they were no longer afraid. They would come to me quite naturally, openly. This trust is something I owe them. Thanks to them, the world was no longer merely an inquisition chamber. Then one day I was transferred to another prison. I never saw my mosquitoes again. This is how you are deprived of the presence of your friends in the arbitrary world of prisons. But you go on thinking of them, often.

During the months when I was being interrogated, alone before those men with the multiple eyes of a spider—and the instincts of a spider—one night a policeman on guard

smiled at me. At that moment, the policeman was all men to me. Four months later, when the representative of the International Red Cross walked into my cell, once again I saw all men in his friendly face. When one day they finally put me in a cell with another prisoner and he began to talk to me about the thing he loved most in life—sailing and fishing boats—this man too was all men to me. It is true, then, that there are situations in which each one of us represents all mankind. And it is the same with these papers: I have entrusted them to a poor Italian prisoner who has just been released and who was willing to try to smuggle them out for me. Through him I hope they will eventually reach you. That man again is all men to me. But I think it is time I finished. I have raised my hand, made a sign. And so we exist. We over here in prison, and you out there who agree with us. So: *Freedom my love.*

THE NEED FOR A STRONG AMERICA

Mr. FANNIN. Mr. President, a lot of "good news, bad news" anecdotes are being told these days.

Today I have some good news and bad news concerning the AFL–CIO.

The bad news, as is demonstrated in an article that I shall place in the RECORD separately, is that the AFL–CIO is dragging its feet on the President's new economic policy.

Now for the good news. The AFL–CIO has demonstrated a great understanding of the need for a strong America that can defend itself against aggressive nations. This was pointed up in an editorial in the October 2 edition of the Arizona Republic. I ask unanimous consent that editorial be inserted in the RECORD at this point.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

[From the Arizona Republic, Oct. 2, 1971]

WHO IS THE IMPERIALIST?

Among a number of large organizations in the United States, the AFL–CIO stands head and shoulders above the rest for consistent and intelligent commentary on questions of global policy.

AFL–CIO President George Meany has long been known for his forceful opposition to policies of national weakness, and has proved a courageous voice in the battle to defend free world interests from the incursions of the Communists.

Now the AFL–CIO has surpassed its own excellent record with the publication of a document entitled "Who Is the Imperialist?" This is a fact-laden study of Cold War trends since the epoch of World War II, answering in detail the charges of the New Left and assorted Marxists that the United States is guilty of "imperialism."

The study cites chapter and verse to show the real imperialists in the world today are the Soviet Union and Communist China. The historical record is set forth at length demonstrating that the Communists have created the largest slave empire of modern times—committing direct aggression in numerous cases and creating dependent proxy regimes in others.

As a result of these aggressions, the study notes, the Communists have directly annexed more than 825,000 square miles of territory from 11 other nations, embracing a population of more than 25 million people. They have also secured control over 13 dependencies with over 1 million square miles of territory and more than 146 million people.

The total slave empire thus created—not counting the U.S.S.R. and Red China themselves—amounts to 1.9 million square miles out of the earth's surface and 172 million human beings.

While all this has been going on, the free world for its part has been granting independence at a pell-mell rate to former colonial holdings. The AFL–CIO report lists no less than 68 newly independent states given self-determination in this fashion between World War II and 1970.

Independence has thus been granted to 1.15 billion people inhabiting 13.2 million miles of the earth's surface. So who, the AFL–CIO wants to know, is the imperialist?

There is more in this excellent study which cannot be covered here. For those who would like to have this valuable handbook for reference, we suggest writing to AFL–CIO national headquarters, 815 16th St., N.W., Washington D.C. 20006.

SHAPING TODAY'S TECHNOLOGICAL PROGRAMS

Mr. BENTSEN. Mr. President, Gen. John C. Meyer, Vice Chief of Staff of the Air Force, recently addressed the Alamo chapter of the Air Force Association in San Antonio, Tex.

In his remarks, General Meyer pointed out that the Air Force today is able to do more with the resources available to it through improved technology and a more efficient research and development program. The general made clear how badly we need an expansive research and development program and offers some helpful insights into how the Air Force is seeking to meet this need.

In effect, the present problem facing the Air Force is how to do more with less in shaping today's technological programs. The answer to that question will greatly determine our Nation's future security, and for that reason I recommend General Meyer's comments to the Senate, and ask unanimous consent that the address be printed in the RECORD.

There being no objection, the remarks were ordered to be printed in the RECORD, as follows:

THE PEACETIME AIR FORCE OF THE SEVENTIES: LESS MONEY, FEWER PEOPLE, MORE TECHNOLOGY

(By Gen. John C. Meyer)

As we consider that Air Force in a generation of peace, it is interesting to look back to the last peactime year. The year is 1964, and the Gross National Product is $612 billion. The country is allocating a little over 8 per cent of it to the Department of Defense—that's one dollar in every twelve. The Air Force is receiving 40 cents out of each Defense dollar—a total of $20 billion. With those funds, we have a force of 850,000 in uniform—about 50,000 of them right here in San Antonio—and over 320,000 civilians. That was 1964 and twenty billion 1964 dollars.

It is now eight years later—and a quarter of the way through fiscal year 1972. We have seen a build-up and then a more than compensating decline in the size of our forces. We have seen a leveling off in the size of the Defense and Air Force budgets. Although we still have over 45,000 officers and airmen in the San Antonio area, and close to 30,000 civilians, we have witnessed the over-all Air Force being cut back by 100,000 officers and airmen, and 10,000 civilians—not from their wartime highs, but from the peacetime levels of 1964! And where Defense was getting one dollar out of every twelve in the 1964 GNP, it is now getting one in fifteen. And where the Air Force was getting 40 cents out of each Defense dollar, it is now getting only 31 cents.

Then, when you look at that 31 cents that the Air Force gets from each Defense dollar, you find it buys what 23 cents bought back in 1964. So when you see the 1972 Air Force budget of $23 billion, you find it has the purchasing power of $17 billion in 1964.

In that context, the Air Force budget for 1972 is down $3 billion from what our 1964 peacetime dollars bought in 1964. It pays for a smaller Air Force that is costing less in every measure except inflated dollars. It is smaller in numbers of people and in forces. The number of active Air Force airplanes is down about one-quarter—from 12½ thousand to 9½ thousand. Bomber squadrons are down from 78 to 30. Interceptor squadrons are down from 40 to less than a dozen. Fighter squadrons are down from 79 to 70. And, strategic airlift squadrons are down from 33 to 17.

And this is before the war in Southeast Asia is over. With these forces and dollar levels, we are flying thousands of sorties in Southeast Asia. At the same time, we are fulfilling our NATO and Free World commitments. And, you might very reasonably ask, "How is this possible?" and "How long can you continue to meet those commitments?"

The answer to the first question is through greater productivity. Now it's true that the Air Force has set its sights lower. The so-called 1½-war strategy has reduced the requirement for some of our forces vis-a-vis the 1964 2½-war planning factor.

But a significant change in capability—and an increase in productivity—has come from more advanced technology. This is clearly evident in our strategic deterrent forces. The 1964 mix of 821 ICBMs and 78 bomber squadrons is now 1054 ICBMs and 30 bomber squadrons. The annual cost of these forces has dropped from $4¾ billion in 1964 to $3 billion this year. Or, in 1964 dollars were down to $2½ billion—about half the 1964 cost.

At the same time, the number of ready warheads available on Air Force aircraft and missiles is 75 percent of the 1964 level and climbing. This increased productivity is attributed to a different balance of aircraft and missiles, and to the employment of multiple reentry vehicle technology on the Minuteman III.

For the near future, we will be able to continue to convert advanced technology into increased strategic capability. More of our ICBM silos will contain Minuteman IIIs and our manned bombers—the B–52s and the FB–111s—will get a new air-to-ground missile with a nuclear warhead: the SRAM. A B–52 can carry 20 of these rocket-powered missiles in addition to its gravity drop weapons, and an FB–111 can carry six.

For the more distant future we are investing now in the development of the B–1 bomber. It should be coming along in the latter part of this decade to replace the B–52s. It too will carry the same missiles—the SRAMs—but it will carry as many as 32. Yet, the B–1 will only be ¾ the size of the B–52. And, as seen by radar, it will be only a small fraction of the size of a B–52—a key factor in penetrating improved defenses.

This means further increases in the "productivity" of our strategic systems through this decade and into the 1980s. Now, the last time I said that, I was interrupted and asked, "If these systems are getting more productive or effective, why not concentrate on just one—missiles or bombers?" It takes me about one minute to answer that. It goes something like this:

The reason we have these forces is *not* because we look forward to fighting a war with them—but just the opposite. These missiles and bombers are deterrent forces—we have them to keep an enemy from attacking us. This means that any enemy looking at the United States must see an array of forces that he cannot hope to destroy.

In order for him to see that picture, clearly and unmistakably, we have to have a diversity of forces that cannot be destroyed in a surprise attack. And that is what the combination of missiles—both land-based and sea-based—and bombers gives us.

The *combination* of missiles and bombers assures that any mass attack on one element of these forces will give sufficient warning to the others. And by "sufficient", I mean enough time to launch a really massive reaction. That is why our Triad of strategic forces is an effective nuclear deterrent. Each has its own unique capability for the percent ready, positive control, relative survivability, and type of Soviet Defense required. For surprise attack against any one—or two, the attacker must anticipate swallowing the full weight of another. And that is also why we cannot afford to rely on any one strategic system—or even two.

Our General Purpose or tactical forces have also fared quite well. These, of course, are the forces that expanded to meet the demands of the war in Southeast Asia. The number of fighters climbed from 2,200 in 1964, to a peak of over 3,100 and back down to 2,500. In this build-up and draw-down we have been able to phase out older aircraft. As a result, we are now headed for 70 squadrons of modern tactical fighters: F–4s, A–7s, F–111s and later the A–X for close air support.

Here again, these aircraft are more productive than their predecessors. They can carry more and they can carry it farther. The A–7 can be loaded with over seven tons of bombs whereas the F–100 can barely carry two. And, the pilot in an A–7 can deliver those weapons with greater precision. The same sort of comparison can be drawn between the F–111 and the F–105—except the advantages in range, payload and all weather capability are even greater. And, of course, the F–4 has great versatility for attack and air superiority missions.

In addition to having each aircraft able to carry more, to greater distances, we also have smarter weapons. By that I mean weapons that are able to help themselves get to the target after they have been dropped or launched.

Several of these smart weapons have proven themselves in Southeast Asia. These are the anti-radiation missiles that home on the radar signals of enemy surface-to-air missile sites, and LASER guided bombs. The LASER bombs home on targets that are pinpointed by a pencil-like beam of a LASER that can be either airborne or hand held on the ground. The virtue of these smart bombs is that fewer sorties and fewer weapons are needed to knock out troublesome targets. Again, we are using technology to get greater productivity.

And just as was the case with strategic weapons, we will be able to continue to convert advanced technology into greater tactical capabilities. We expect to increase our stable of smart bombs and soon we will field the rocket-powered Maverick missile. The Maverick is just completing its development flight tests and has demonstrated that it can hit just about anything it can see—moving, or not. With this 500-pound missile, a pilot can zap a tank from several miles out.

But there's one case where we are going to need advanced technology just to stay in the ball game—and that's air superiority. When one of our F–4s tangles with a Soviet-built MIG–21, it's something of a stand-off. We have the advantage at lower altitudes but it starts to fade at higher airspeeds and altitudes. We can improve the F–4 by changing its wing form—and we're doing that by putting on leading edge slats. But for the long pull, we know we will need a new aircraft.

That's why we are investing in the development of the F–15. The design of this new fighter is able to take advantage of all of our accumulated technology. As a result, where air-to-air combat takes place, it will out-climb, out-maneuver and out-accelerate a MIG–21, a MIG–23, or any kind of MIG you might find in the next decade.

Throughout my remarks I have been describing now the Air Force is able to do more this year than it was able to do in the last peacetime year. I have pointed out that although we have about 3 billion fewer 1964 dollars in fiscal year 1972, we have been able to maintain our strategic deterrent and our general purpose forces. And the reason—at least one very good reason—has been increased productivity achieved through the application of advanced technology.

Now, technology is something like farming: you plow the land and plant the seeds; you water, weed, and fertilize; and then, if the elements are good to you, you harvest a crop and get it to market. But there is a lot of time and uncertainty between plowing and seeding, and harvesting and marketing. The technology I have been talking about is the harvest from some difficult plowing back in the sixties and some hard to come by seeds.

In 1964, we invested $3.6 billion in technology. It supported work in rocket engines and advanced reentry vehicles. It paid for new jet-engine developments and experimental work on LASERs, low light level TV, and life support systems. That, and other money invested in the past, paid for the technology that is—or will be—going into Minuteman III, the SRAM, the new B–1 bomber, the smart bombs and the F–15. And that is why we are able to continue to deter an attack on this country and meet our worldwide commitments.

But the other question I've been asked was, "How long will we be able to do more for less?" And the answer to that question is in today's technology programs—the ones that will begin to pay off in five, or ten, or fifteen years.

You might reason that because our earlier programs provided the technology we needed, so will current programs. But when you look at the R&D program today—and compare it to 1964, in 1964 dollars—you find it, too, is down 40 per cent. For every dollar used to buy technology in 1964, there is only 60 cents this year.

This casts a cloud over the future that is made darker by growing Soviet efforts to achieve technological breakthroughs. Although relating Soviet technology efforts to our own is difficult in a quantitative sense, one thing is sure: their effort has been increasing while ours has been decreasing. And when you consider what they have been able to do in the past—starting with Sputnik in 1957, and moving through a decade of a new fighter plane every year-and-a-half, or so; and now with new ICBM capabilities and a new supersonic long-range bomber—you get a rather ominous feeling.

For sure, you don't dare let your technology guard down. You try to get more dollars for technology and you try to get more technology out of each dollar.

Right now, we are doing both. Our technology budget is 7 per cent larger than last year's and that could mark a reversal in the downward trend we have had since 1964. Mind you, it's still only 60 cents on every 1964 technology dollar, but that's more than it was last year.

Then too, we are managing those dollars more effectively. One result is approved development programs on our most needed new systems: the B–1 bomber, the A–X, the F–15 air superiority fighter, Minuteman improvements and the Airborne Warning and Control System—AWACS. And, we are very careful about the management of those programs. As an example, both the B–1 and the F–15 must demonstrate development milestones before they can move to the next phase. One milestone is performance in flight—before going into production.

Another result is that our laboratories concentrate on the projects that offer the greatest promise. As dollar levels decreased, and purchasing power declined even faster, we became more selective. We still pursue innovations in materials, propulsion, and flight dynamics; but we don't pursue as many as we did, nor do we follow as many parallel paths.

This has been necessary and, to some extent, beneficial. But I would hasten to add that a parsimonious technology program can be self-defeating. The project you defer, or cancel, can be the one you needed most. And you cannot be sure which will be successes and which will be failures. It's like the corporation president who knew he was wasting half of the money he spent on advertising—he just couldn't tell which half it was.

But, at least as far as we can tell, we are buying the technology we need. And, we are reversing the downward trend in the money we had for this important work.

What all this means is that peacetime Air Force of the 70s will be smaller but more effective than the peacetime Air Force of 1964. It will take a smaller percentage of the GNP and spend it with greater care. It will have fewer people in uniform, but they will be more productive. It will have more missiles and fewer aircraft, but each will be able to do more. And this can be true because we are able to harvest the benefits of our earlier investments in technology.

At the same time, I would end on a note of caution. As we move toward the more productive Air Force that I have described tonight, we cannot neglect the importance of sheer numbers of men and machines—especially in the context of Soviet military expansion. The best fighter in the world, with the best fighter pilot in the world, won't give us air superiority unless we have *enough* of them—*where* we need them. Neither will the most advanced bomber deter an attack if we don't have enough of them. And the same goes for all of our other weapons and the people to operate them.

So as we look out into the next decade—indeed, into the next budget—we must be alert to the danger of cutting our forces too thin. To err on the short side of men and machines for today's Air Force can be every bit as disastrous as foregoing the technology for tomorrow's. For that very important reason, I hope you all join me in sharing the concern of the Administration over further reductions in our Armed Forces. When we all recognize that our current Air Force budget is $3 billion less in purchasing power than the peacetime year of 1964, I think we can all appreciate the danger. And where the price of liberty is oft-quoted as eternal vigilance, I would point out that it also has a price tag in men, machines and money—and with the world as it is, it is a price we Americans dare not fail to pay.

CORN PRICES

Mr. CURTIS. Mr. President, I have written a letter to President Nixon and a similar letter to the Secretary of Agriculture, which I ask unanimous consent to have printed in the RECORD.

There being no objection, the letter was ordered to be printed in the RECORD, as follows:

U.S. SENATE,
Washington, D.C., October 15, 1971.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT: I am writing you to urge that immediate action be taken by the Administration to increase the loan rate

on corn and feed grains. The cornbelt farmers are facing a bleak situation. About four months ago the price of corn in Nebraska was around $1.30. Today it is 90¢ or 92¢.

A mistake was made in fixing the corn acreage as high as it was fixed last spring. I am not unaware that there was real danger that the corn blight might have been a very major factor in cutting down the yield. I am also aware that consideration had to be given to the possibility that weather might adversely affect the yield.

The steps being taken by the Department of Agriculture in reference to the corn program for next year will be helpful. These steps should be helpful factors in securing a better price for corn. They will not materially help the situation now. Farmers cannot take a reduction in prices such as has been experienced in reference to corn without dire consequences. All other segments of our economy are talking about and looking forward to their increases. In this instance with the farmers, it is not even holding pre-existing levels. It is a decided deduction.

The 1970 Agricultural Act does carry some provisions for more decisionmaking by the individual farmer which is very desirious from the standpoint of many. The fact remains that aside from its research, educational and conservation programs, the basic function of the Department of Agriculture is to raise farm prices. If there were not a need for raising farm prices, we wouldn't need so much government devoted to agriculture. We face an unusual situation caused by an over-planting and an unexpected bountiful crop running perhaps 25 percent in excess of last year's crop.

The dock strike has been disastrous for agriculture. The refusal of the longshoremen to handle the grain and place it on the ships has very materially depressed grain prices. It has cost the farmers millions and millions of dollars. I commend you for invoking the Taft-Hartley law, and I commend the Secretary of Agriculture for his strong defense of agriculture in regard to these strikes.

The situation calls for action. I urge that action and that the loan rate on corn and feed grains be substantially raised. I am sending a similar letter to the Secretary of Agriculture.

With kindest personal regards, I am

Respectfully yours,

CARL T. CURTIS,
U.S. Senator.

ADDITIONAL DEATHS OF ALABAMIANS IN VIETNAM WAR

Mr. ALLEN. Mr. President, I have placed in the RECORD the names of 1,129 Alabama servicemen who were listed as casualties of the Vietnam war through June 30, 1971. In the period of July 1 through September 30, 1971, the Department of Defense has notified 10 more Alabama families of the death of loved ones in the conflict in Vietnam, bringing the total number of casualties to 1,139.

I wish to place the names of these heroic Alabamians in the permanent archives of the Nation, paying tribute to them, on behalf of the people of Alabama, for their heroism and patriotism. May the time not be distant when there will be no occasion for more of these these tragic lists.

I ask unanimous consent to have printed in the RECORD the names of the next of kin of these 10 Alabamians.

There being no objection, the list was ordered to be printed in the RECORD, as follows:

LIST OF CASUALTIES INCURRED BY U.S. MILITARY PERSONNEL FROM THE STATE OF ALABAMA IN CONNECTION WITH THE CONFLICT IN VIETNAM, JULY 1, 1971, THROUGH SEPTEMBER 30, 1971

ARMY

SSG Ronald H. Hall, husband of Mrs. Bonnie D. Hall, 1327 10th Street, Southeast, Cullman, 35055.

SSG Willie James, Jr., son of Mr. and Mrs. Willie James, Sr., 508 Summerville Street, Mobile, 36617.

SSG Robert L. Morganflash, husband of Mrs. Olene R. Morganflash, 2200A 7th Avenue, Huntsville, 35910.

1LT Gary P. Tomlinson, husband of Mrs. Suzanne B. Tomlinson, 509 4th Street, Southwest, Birmingham, 35211.

SP5 Robert T. Nelson, son of Mrs. Delores M. Stanley, 1002 Arnold Drive, Madison 37758.

SP4 Lynn M. Morgan, son of Mrs. Barry B. Morgan, Jr., Room 8, Palmar House, Chickasaw, 36611.

SSG Leagrant Badgett, husband of Mrs. Joy D. Badgett, Route 2, Box 24, Piedmont, 36372.

WO1 Steven R. Hanson, husband of Mrs. Elinor R. Hanson, 115 North Roberta Avenue, Dothan, 36301.

SP4 Randall K. Clements, son of Mr. and Mrs. Hansel E. Clements, Route 1, Box 61, Gadsden, 35201.

AIR FORCE

SGT Gilbert Ledger, son of Mr. and Mrs. Mack M. Ledger, 6005 Georgia Road, South, Birmingham, 31512.

STATEMENT BY SENATOR MATHIAS ON PHASE II ECONOMIC PROPOSALS

Mr. MATHIAS. Mr. President, last week the President announced his goals and plans for phase II of his new economic policy. I am sure that we all hope that these policies achieve prosperity without war and without inflation, both at home and abroad. To a very large extent, however, the success of these policies depends upon the speedy approval by Congress of legislation recommended by the President and providing for the restoration of the investment tax credit, repeal of the auto excise tax, and acceleration of the standard personal income tax exemption.

Mr. President, the House has already given its approval to these measures. The proposed legislation is now pending before the Committee on Finance, of which the distinguished Senator from Louisiana (Mr. LONG) is the chairman. On Wednesday, I had the privilege of appearing before that committee, and I hope my remarks might be of interest to Senators and to many of the citizens of the State of Maryland.

I ask unanimous consent that the statement I prepared for the Finance Committee be printed in the RECORD.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

STATEMENT OF SENATOR CHARLES MCC. MATHIAS, JR.

Mr. Chairman and Members of the Committee. It is always a pleasure to appear before this distinguished Committee which has so many vital responsibilities affecting the aspirations and the means of every American. I consider myself particularly fortunate to speak to you at this time when you are considering legislation which is a key element of an economic package perhaps more far-reaching and ambitious in both its goals and consequences than any series of economic proposals put forward by the Executive Branch in the last generation.

For this reason, I would like to set forth very briefly for your consideration my views concerning, first, the goals we should strive to achieve, second, the problems currently facing our economy, and third, the steps necessary to surmount these problems and achieve our goals.

Mr. Chairman, America is today the richest nation on this planet and the richest nation in the history of our civilization. But, as the Bible says, "Man does not live by bread alone." Man needs a sense of purpose, a higher meaning in his life, a feeling of community with his fellow citizens and a fundamental belief in the justice and fairness of the economic, political, and social institutions which surround him.

In structuring economic programs in these times of relative hardship we must strive to meet, not only the needs of the theorists' "economic man," but these more fundamental needs of the whole man.

Given this most fundamental goal, I believe the President has quite succinctly stated a second goal. That is, the achievement of balanced and widespread prosperity without war and without inflation. Prosperity alone can be neither equitable nor just, nor can it respond to the deeper needs of mankind, if it is bought at the expense of young soldiers dying in a far-off land or at the expense of elderly and retired persons whose fixed income is sapped by runaway inflation.

The goal of prosperity without war and without inflation can only be achieved if we remain fully cognizant of our international responsibilities. We have been reminded in recent months by many, many citizens that we live on "spaceship earth". This catch-phrase makes vivid the fact that we are inevitably affected by the actions—concerning the environment, concerning peace, concerning the worth of our culture, and concerning the productivity of our economic system—of peoples on every continent of this planet. Therefore, Mr. Chairman, the third major goal must be the achievement of international economic harmony and progress. In this line, I heartily endorse the President's efforts to achieve fair and free trade.

Given these goals, let me now mention a number of major problems which are currently confronting our economy. First, there is unacceptably high unemployment throughout America, now at 6 per cent of the potential working force. Secondly, there is an unacceptably high rate of inflation. Third, there is a depressingly low trade balance, or imbalance. Fourth, there is a growing obsolescence of the industrial equipment being used in many of our major industries. Fifth, there is, on the surface, a decreasing competitiveness of many American goods in foreign markets and, indeed, in our own domestic market. Sixth, as a result of several of the above factors, American industry and labor are not working at their full capacity and American productivity is not increasing as rapidly as we would want or as rapidly as history would suggest we should expect. Seventh, as the President continues to wind down the war in Vietnam and decrease our military commitments abroad, we are faced with a growing need for economic conversion of our industries from military

to civilian production. Eighth, we see around us a loss of pride by many American workmen, a sense of meaninglessness in their toil, and a questioning of the basic values inherent in our system of production.

These are some of the major problems which I believe all of us must address ourselves to in the coming weeks. Let me now discuss some proposals to alleviate these problems. First, the job development credit. Mr. Chairman, I strongly believe that a moderate job development credit, or investment tax credit as it is also called, could help in meeting each of the problems I have mentioned if it is coupled with the type of broad-based economic program suggested by the President and perhaps including some proposals put forward by the members of the committee.

It was for this reason that I introduced into the Senate on July 7 of this year S. 2225, which would restore the 7% investment tax credit. Some details of my bill differ from the provisions of the measures sent to us by the House, but the fundamental thrust of the bills is identical and I would strongly urge this committee to endorse and report favorably on the provisions of the House bill involving the investment tax credit. I believe this credit will encourage American industry to overcome the creeping obsolescence in American productive equipment. I believe the credit also will help increase American productivity, make our products more competitive at home and abroad, create new jobs, improve our balance of payments, and aid industries in converting from military to civilian production. As it helps accomplish these goals, then I believe the credit will also help give the American worker more pride in his daily toil and more confidence in the fundamental soundness of our economic system.

I know that some have expressed doubts about the effectiveness of job development credit. For this reason, I went to a number of the economic leaders in the State of Maryland and discussed with them very seriously and in great depth whether a credit at this time would be of great benefit to all Marylanders. Their response was almost unanimously positive.

Moreover, the facts show clearly the need for and the worth of the job development credit. American investment in new machinery and equipment has been sagging badly in recent months. Last year, expenditures for new equipment were abnormally low. This year, the latest survey indicates expenditures will rise by only two per cent. This means that, in terms of real dollars, expenditures for new equipment this year will be less than expenditures last year.

America cannot expect a rapid rate of economic growth if it continues to decrease expenditures in new and improved equipment.

The report of the House Committee contains information which shows very dramatically that, since 1960, domestic new orders for machine tools have decreased strikingly every time we have not had a job development credit. On the other hand, new orders have risen sharply during periods when we have had the credit. What has been true in the past will, I feel, remain true for the future.

The question might arise. "If the investment tax credit is so good, why was it repealed in 1969?" One reason, I think was the widespread belief in the spring of 1969 that investment in new equipment was already very high and was about to soar even higher. But the economic situation today is very different than the situation in 1969. Then, investment in new equipment was very high, now it is very low. Then we were in a business boom, now we are experiencing an economic slowdown. While the repeal of the tax credit may have seemed wise in 1969, I believe restoration of the credit is imperative today.

For all these reasons, I have no hesitation whatsoever in supporting the measure which I introduced in legislative form to the Senate in July, which the President recommended to the nation in his message of August 15, and which the House has agreed to and has sent over to this committee for its consideration.

Beyond this one measure, though, there are a number of other steps which I believe should be taken. First, I hope that we in the Senate can give speedy approval to the bills now before this committee involving acceleration of the standard personal income tax exemptions and the repeal of the auto excise tax. These measures would mean additional money in the pocketbook of every American. It would mean additional buying power for all Americans and additional demand for American products.

Secondly, I hope that our country can end very soon the 10 per cent import surcharge which the Administration believed was necessary to impose as a bargaining tool for the current monetary negotiations.

Third, I hope we can give increasing emphasis to economic conversion in the months ahead. To this end I have introduced a bill, S. 1191, which would provide aid for retraining workers, and for helping communities affected by conversion, and would require industries to prepare plans for a smooth transition from military production. This bill is now pending before the Commerce Committee.

Fourth, I believe the U.S. should issue a call during the coming months for an international conference on trade which would follow-up on the agreements of the current international monetary conference.

Fifth, we must face up to two of our most critical domestic problems: the growing gap between the revenues and the responsibilities of our state and local governments and the plight of millions of Americans who, through no fault of our own, are not able to earn an adequate income. To this end, I hope that this committee can soon report favorably to the Senate the proposals it is now considering on welfare reform and revenue sharing.

Mr. Chairman, these are some of my thoughts as I have been reflecting on our current economic situation. I want to thank you and the members of this committee once again for the opportunity to appear before you and present my views for your consideration.

IS GENOCIDE INTERNATIONAL OR DOMESTIC?

Mr. PROXMIRE. Mr. President, the argument has been made that the Senate should not ratify the Genocide Convention, because genocide is purely a domestic affair and not subject to international regulation. It is not considered proper to guarantee human rights by treaty.

But this argument is incorrect. The best example we have of genocide, the actions of Nazi Germany during World War II, is quite international in scope. The actions occurred from France to the heartland of Russia, from Norway to Greece. And they occurred in the midst of the most international war that the world has ever seen. Clearly, therefore, genocide is a proper concern for international remedies, such as treaties.

There is precedent for our ratifying the Genocide Convention. The United States is a party to several human rights conventions, one of which is the Supplementary Convention on the Abolition of Slavery. If we can be a party to a treaty which is designed to prevent the crime of slavery, then surely we can be a party to a treaty which is designed to prevent the far worse crime of mass murder.

Mr. President, the Senate should ratify the Genocide Convention as soon as possible.

CHRISTOPHER COLUMBUS

Mrs. SMITH. Mr. President, a year ago on October 22, 1970, the junior Senator from Alaska (Mr. GRAVEL), in a speech deploring the trend toward slashing NASA budgets and the general decline of our interest in space programs, made a most interesting revelation that is quite pertinent to Columbus Day.

In his speech to the American Institute of Aeronautics and Astronautics in Houston, Tex., he said among other things:

> The timorous and confused leadership we are experiencing today is not altogether different from that experienced in the tumultuously changing Renaissance and Baroque periods. Christopher Columbus faced a similar situation.
>
> A few years ago a report prepared by the Senate of Genoa on Columbus' audacious proposal for ocean exploration was discovered in the library of a Spanish Monastery. Columbus had appealed for help from his native State of Genoa, and the Senate—in a manner not unlike more contemporary legislative bodies—appointed a committee to study the problem.
>
> As a legislator I am somewhat embarrassed to add that the report was 964 pages long—and it tried to discourage Columbus from his proposed voyage!
>
> This remarkable document ended with a brief reference to one member of the committee, described as a "rash and impetuous young engineer" who "showed his immaturity and poor judgment by advocating that the voyage be initiated immediately." The report went on:
>
> "Investigation proved him to be quite eccentric (he talks of flying machines and fancies himself an artist), and he was therefore dismissed from the committee. He is the son of a Florentine notary, and in case you desire to contact him, his name is Leonardo Da Vinci."

I find this revelation most interesting and fascinating. I would hope that an appropriate agency of the U.S. Government would obtain or make a copy of the 964-page report to study and add to whatever historical collection we have on Christopher Columbus.

It is in this spirit that I have written Senator GRAVEL asking him whom I can contact to get more information on this intriguing report.

JOHN BAILEY'S 25TH ANNIVERSARY

Mr. RIBICOFF. Mr. President, John Bailey's recent celebration of his 25th anniversary as chairman of the Connecticut Democratic Party has been the source of much news comment. A most interesting article was written by Don Meikle, of the Associated Press.

Mr. Meikle is a perceptive political writer, and his story of John Bailey's career in Connecticut's politics is interesting and well worth reading.

I ask unanimous consent that the article be printed in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

BAILEY REACHES 25-YEAR MARK AS DEMOCRATIC STATE CHAIRMAN

(By Don Meikle)

HARTFORD.—John Moran Bailey, kingmaker, power broker and boss, has not only succeeded in politics, he has done something much more difficult. He has survived.

Thursday was Bailey's 25th anniversary as head of Connecticut's Democratic organization, and the 66-year-old chairman still seemed in no imminent danger of being put out to pasture.

He is not even in danger of becoming an institution. He still has that indisputable proof of vitality: enemies.

Cries go up for the balding scalp of John Bailey; people say he isn't what he used to be; but there is no solid evidence to indicate that he is any less indispensable than he ever was. As long as the Democrats who need him outnumber the Democrats who want to get rid of him; as long as Republican candidates campaign against him instead of their opponents; as long as GOP governors—such as Thomas J. Meskill—respect him enough to banish him from important negotiations, Bailey will continue to be the chairman.

"IRISH MACHIAVELLI"

This "Irish Machiavelli" is damned if he does and damned if he doesn't. If he gets his way, his enemies say he's an arrogant dictator and demand he be deposed. If he fails, they say he's ineffectual and should be replaced.

But failure has its rewards in politics, and is generally easier to survive than victory. For instance, Bailey is more secure now, with a Republican in the governor's chair than he would have been if Democrat Emilio Q. Daddario had won the gubernatorial election last year. The political axiom is that it's your allies who do you in, not your opponents.

Bailey has displayed a remarkable ability to get along with just about everybody. As national chairman for nearly eight years, the longest tenure of anyone in that high-mortality job since Jim Farley, Bailey was equally useful to President John F. Kennedy and Lyndon B. Johnson. As state chairman, he has served under three Democratic governors. And, during his quarter century as chairman, he has seen Connecticut change from a basically Republican state which voted for Thomas Dewey while Harry Truman carried the country to a basically Democratic state which voted for Hubert Humphrey while Richard Nixon was winning.

TIMES HAVE CHANGED

Times have changed, and John Bailey has been able to accommodate himself to the changes. Next week he will go before the reconvened state convention to try to sell the reforms demanded by the McGovern Commission. As usual, his arguments will be practical rather than idealistic. Connecticut Democrats, he has already pointed out, face the possibility of having their delegation to the 1972 national convention challenged by the Credentials Committee unless the party structure is made more accessible to the rank and file.

Bailey rose to power and stayed in power because he mastered the rules of Connecticut's relatively closed party system. Yet he is now presiding over the demise of that system.

Bailey has been able to live with more than one reform and to charm more than one suspicious reformer. In 1968, when the Gene McCarthy enthusiasm was at its height, Bailey was confronted by the state chairman of the McCarthy campaign, the Rev. Joseph Duffey, at the state convention—Duffey and his troops wanting more national convention delegates than the party regulars were willing to stand for.

To the uninitiated, it looked like that classic situation—Mr. Clean versus Mr. Dirty. But Duffey was not too pure to deal with Bailey. Playwright Arthur Miller, a delegate who as a former newspaperman should have known better, was taken aback to discover that Duffey was in the proverbial smoke-filled room at convention hall working out the problem with Bailey.

This was the new politics.

In that smoke-filled room, as in other dealings with Bailey, Duffey found himself having to respect the boss. And when he emerged, he tried to convince his skeptical following that John Bailey wasn't so bad after all.

In 1970, Duffey won the first state-wide Democratic primary in history and went on to lose the election for U.S. Senator. Bailey probably knew Duffey couldn't win, but he didn't pull out all the stops to prevent Duffey from qualifying for the primary.

ONCE YOUNG INSURGENT

It should be remembered that every old boss was once a young insurgent. Bailey is no exception to the rule. He was one of the early leaders of the Young Democrats and served as national treasurer of that group from 1937 to 1941. In 1932, he had become the youngest member of the Democratic State Central Committee at the age of 27.

Not that Bailey could be labeled a "liberal"—or a "conservative" or anything else that implies adherence to an idealogy. His pithiest utterances are on the subject of political tactics, not public issues.

"You do what you gotta do."

"You be where you gotta be."

"You can't beat somebody with nobody."

As an oracle, Bailey sounds like a Hemingway character. You wouldn't guess he was the scion of an old and well-to-do Hartford family and a graduate of Harvard Law School.

"He is wealth and Harvard; He is the wards and Hartford," Wrote his biographer, Joseph I. Liberman, like many others before him, discovered when he worked under Bailey several years ago that the "mysterious figure of merciless, manipulative genius" turned out to be less sinister and less fearsome than he had seemed in the newspapers.

Bailey has to be one of the most misunderstood people in Connecticut. The popular mythology about political bosses is that they go around giving orders with the callousness and authority of an extermination camp superintendent.

HAS HIS OWN STYLE

But Bailey's style is frequently marked by an air of helplessness. "What else could I do," he asks, blunting the ire of the disappointed and the disgruntled by appealing to their sympathy. "I'm not blaming you, John," is the likely reply.

Bailey's style is more that of obfuscator than dictator. Attending a State Central Committee meeting with newsmen are now allowed to do is a lesson in the Bailey style of governance. It looks like a parliamentary shambles, and it is. But out of that disarray, out of that stew of disagreement, Bailey often manages to create consensus.

He's like the magician who throws a deck of cards in the air and manages to rapier the ace of diamonds before it hits the floor.

One of the most articulate of Bailey-watchers, Joseph Lyford of Fairfield, who tried unsuccessfully to buck Bailey and win the nomination for congress-at-large in 1958, describes him this way:

"He is not an organizer . . . his techniques are often more improvised than calculated, and he is better at extricating himself from trouble than in keeping out of trouble . . . He herds the organization along with an imprecision and confusion which accords well with a party filled with cranky, competing individuals.

"It is even inaccurate to say that the organization is 'under' Bailey; often it is the other way around, with him down below somewhere looking at the wheels."

FAILED IN ELECTION BID

Bailey once tried being a candidate as well as a politician and it didn't work out. In 1940 he ran for judge of probate in Hartford, and he lost by 15,000 votes while President Franklin D. Roosevelt carried the city by more than 22,000. It was a showing that Bailey the politician could hardly approve of.

In 1949, Bailey once more had dreams of being an officer-holder when U.S. Sen. Raymond Baldwin resigned, leaving the choice of his interim successor to Democratic Gov. Chester Bowles. But instead of Bailey, Bowles picked his ad agency partner, William Benton. Bailey went out and helped "sell" the Benton appointment to the party regulars.

The rewards and the prestige of public office eluded John Bailey. Probably he decided long ago to live with the knowledge that he would always be the bridesmaid, never the bride.

Not that being a bridesmaid is no fun. In 1960, four years after an unsuccessful attempt to put across young John Kennedy as nominee for vice president, Bailey found himself in the winning corner when Kennedy won the nomination for President. And then the election. And then came the national chairmanship for Bailey.

Somehow the lessons learned in little old Connecticut proved useful on the national level. Bailey survived the advent of Johnson and proved his value to two different Presidents, a unique accomplishment.

MAN OF HIS WORD

Bailey's secret of survival is something many people have tried to figure out. Maybe nobody ever will figure it out completely, but part of it has to do with being a man of his word.

In the chaotic marketplace of politics, a man's word is often the only valid currency. By all accounts, even those of his enemies and his victims, Bailey does not mislead people. He leaves that to the candidates for public office. If he can't or won't deliver something—a job, say, or a nomination—he won't lead you to believe he can or will.

Bailey's chairmanship is a tough act to follow, and what will happen to the Democratic party when someone else becomes the boss is something that many Democrats don't want to think about.

And what would the GOP do without John Bailey to kick around.

In the meantime, that tall, drooping figure will continue to be a familiar sight in the halls of government. There will be the boss, alternately chewing and waving his cigar, pushing his glasses up on his damp forehead and letting them fall abruptly down on his nose never, never looking through them, listening cajoling and dealing—and enjoying himself thoroughly.

ECONOMIC POLICY

Mr. FANNIN. Mr. President, the free enterprise system has thrived because it offers just rewards for persons who are willing to work hard and invest intelligently. It is a pragmatic system that has made us a wealthy nation offering opportunity to all who are willing to seize it.

People invest their time and money in business only, because they can earn more money. These investors include the very rich and the not so rich and the average citizen who owns a few shares of stock.

When the opportunity to make money through an investment is taken away, or when income from investments is taxed too high, then the incentive that makes our system work is taken away. Entrepreneurs, whether they be multimillionaires or the corner drugstore owner, must turn

a profit worthy of their investment in money, time and talent.

It is shocking that the leaders of unions in this Nation refuse to recognize how our system works. They insist that "profit" is a dirty word.

Yet "profit" is the very key to a free enterprise system.

Take away profit and Government must take over the operation of all the enterprises that are required by 20th century society. Once you do this, then there is no longer any rationale for labor unions either. In a socialistic system, the union official is a very expendable middle man.

It is absolutely essential that we have a system which encourages persons to invest and earn a profit.

Despite this fact, union spokesmen are conducting a campaign to vilify investors and to penalize those seeking profits.

In testifying before the Senate Finance Committee this week, Andrew J. Biemiller, director of the department of legislation for the AFL–CIO, said:

> In our opinion, he (President Nixon) has proposed a giant raid on the Treasury that would transfer billions of dollars of badly needed public funds into the private treasuries of big business.

Thus we have a union official trying to conjure up the picture of big corporations hoarding away huge sums of capital.

This is ridiculous.

When corporations acquire money in their treasuries they start looking for ways to put it to work to earn more money—and the way to do that is to invest in more equipment and to develop new products, both of which add much needed jobs for Americans.

As it is now, the United States has a taxing system that puts our industry at a tremendous disadvantage in international trade. That is one big factor in the loss of American jobs.

Mr. President, I believe that President Nixon's program is a well-rounded approach that is fair to all segments of our society—at least as fair as any program which can be realistically carried out.

Some of the points that should be emphasized were brought out in last Saturday's Washington Post in an article written by Arch N. Booth, executive vice president of the Chamber of Commerce of the United States. So that my colleagues may benefit from this presentation of the business viewpoint, I ask unanimous consent that the article be printed in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

A CHALLENGE TO LABOR UNION LEADERSHIP: TREATING OUR ECONOMIC TROUBLES: BUSINESS'S VIEWPOINT

(By Arch N. Booth)

So far, most of the attacks on President Nixon's new economic policy have been classic examples of an appeal to emotion and prejudice for political purposes in the absence of factual support. George Meany's article of Sept. 21, in the Washington Post, is a representative of the breed. The AFL–CIO obviously hopes that by reinflating the tired old specter of class conflict, attention may be diverted from a very real problem: The unbridled power of a selfish and irresponsible labor establishment. Never has that arrogance been more prominently on public view than it was immediately following the President's call for all Americans to cooperate in ending our economic troubles.

The George Meanys of the world must believe that the money to pay taxes springs into being spontaneously in the Treasury vaults. Otherwise, how could they believe that the way to create more wealth for everyone is to cripple the wealth-creating apparatus?

In this country, nearly all jobs and pay come from business—directly or indirectly. Therefore, it is not difficult to understand that for jobs and pay to be plentiful, it is necessary for business to be healthy. American business today is not well. Even organized labor seems to grasp that. The disagreement comes over the treatment.

The demagogues have been demanding "more" tax relief for individuals than for business. The most obvious reply to be made is that individuals are getting more tax relief than business. The President's program calls for a reduction in taxes paid by individuals, including the cut in the auto excise tax, by $3.3 billion a year, and a reduction in business taxes—through the Job Development Credit—of $2.7 billion. An additional $100 million for DISC would bring the total for business to $2.8 billion.

The Secretary of the Treasury, John B. Connally, discussed this issue before the House Ways and Means Committee on September 8:

"This question of business benefits versus individual benefits must be put in perspective; they are not separable. I know of no better way to gain this perspective than to go back to January 1969, and compare business and individual tax actions since that time. Many of us tend to forget that Congress, in enacting the Tax Reform Act of 1969, granted a massive tax cut to middle and low-income individuals, while raising taxes sharply on business corporations and individuals in the top brackets. Let's look at the record.

To be complete, the record must include the impact of the Tax Reform Act, plus the administration's change in depreciation regulations and the tax proposals of the new economic policy. If the impact of these measures is spread over the five years, 1969 through 1973, the result is startling:

"Federal income tax payments of individuals will have been reduced by almost $34 billion. Tax payments on corporate profits will have declined by slightly more than $1 billion."

In addition to the effect of these tax-rate changes, the owners of American industry are already taxed twice—once under the 48 per cent corporate profits tax, and again when dividends are taxed as income.

And until this year's upturn, profits as a percentage of Gross National Product were the lowest since the Depression '30s. As a share of the sales dollar, they were the lowest in 15 years—about 3c out of each dollar.

Put it all together and it hardly sounds like favoritism for business.

Further burdening business with an increased share of the tax load would obviously not induce allocation of its diminishing after-tax income for modernization, but could force many businesses into bankruptcy.

A common argument against tax credit for new capital equipment is that only 73 per cent of our productive capacity is currently being used. That is true as far as it goes, but it conveniently ignores the important fact that much of the remaining 27 per cent is old, inefficient, and far below the standard of the machinery being used by our foreign competition. American business can approach the goal of operating more nearly at 100 per cent of capacity and employing more people if it is enabled to take the risks of modernization and expansion on a basis comparable to that of its rivals for trade around the world.

We have seen that individuals are in fact not receiving worse treatment than business under the President's program. Quite the reverse. But the degree of "balance" between the tax relief accorded to consumers and that accorded to the business sector is not directly relevant, though it may be coincidentally so. The real question is simply: How best to stimulate the economy? A healthy economy will benefit both business and the consumer.

Putting still more money in the hands of the consumer would be worth considering if there were some evidence that consumers would spend enough of it to give the economy the needed stimulation. But the evidence is on the other side. Consumers are currently saving at near-record rates—above 8 per cent. Additional money socked away in the savings accounts would be of little help in ending the slump.

Consumers are saving because they are scared. With unemployment high and business sluggish, we all feel economically insecure, so we save. Obviously, if we cannot induce consumers to provide the push toward recovery, then we must try to stimulate business.

Increased business activity should provide jobs for the unemployed. When unemployment drops, consumer confidence will return and consumers will spend again, further stimulating the economy.

The key to recovery, therefore, is business, not the consumer.

The President's new economic policy does not really seek a "new tax break" for business, but merely a return to the highly successful growth-promoting policies of the early '60s.

Everyone benefits from a healthy American economy—business, labor, the old, the young, the rich, and the poor. We as a nation have suffered great economic dislocation due to the Vietnam War, unrestrained domestic spending at home, unfair trade practices around the world and a host of other complex factors. The fires of inflation were burning out of control, and our once proud trading position has been almost completely erased.

It is time for all Americans—including organized labor—to make some sacrifices.

It is time for us to review the basic principles of fiscal and monetary policy—and of the free market economy.

It is time for all groups of Americans to cooperate for the common good.

Union leaders are not only wrong in their analysis of the merits of the President's program, they are sadly out of tune with their fellow citizens. One can only lament the guiding philosophy that their public utterances once more reveal: "Do it our way, or we won't play."

Today's union leadership seems bent on dividing Americans into contesting classes—the old union leader tactics of yesteryear.

But today's union members deserve better than that. They are full fledged participants in our economic society. And they have more to gain if their leaders accept the President's invitation to help make Phase Two work, so we can all return as quickly as possible to a stable, prosperous free economy.

THOMAS M. STORKE—NOT AN ORDINARY MAN

Mr. CRANSTON. Mr. President, I should like to take a few moments to talk about a man. He was not an ordinary man, nor were his accomplishments ordinary. He lived a full life, spanning 6 years less than a century, and his passing last Tuesday, in effect, marks the end of an era in the State of California, and

in the city of Santa Barbara he loved so dearly.

The name of the man was Thomas M. Storke.

Mr. Storke was a man of unusual talent and ability. As a graduate of Stanford University, he began a journalistic career as a $6 a week cub reporter. Three years later, he borrowed $2,000 from a druggist and bought his own paper, the small struggling Santa Barbara Daily Independent. Sixty-four years later, Thomas Storke went into semiretirement by selling his newspaper, now called the Santa Barbara News-Press, which had long since become the largest and most influential paper in the county. And through the years, the 71 years of his journalistic career, he established himself not only as a nationally known editor-publisher, but also by receiving journalism's coveted Pulitzer Prize.

The series of articles for which Mr. Storke received the Pulitzer Prize tells us something about the man himself. In it, he exposed the right-wing Birch Society's clandestine activities in the Santa Barbara area in 1961. His editorials condemned the society for its organization and methods, and challenged it to "come up from underground." In response to the question why he initiated the series, Mr. Storke once replied:

You can't kill a rat with a featherduster.

Another time he said:

What I did was not a courageous gesture . . . It should not be considered courageous to stand up and defend what God and the Constitution have given us.

The series also won Mr. Storke the Richard E. Lauterbach Award from Harvard University's Nieman Foundation, and the praise of then President John F. Kennedy.

His newspaper was as much his life as it was the means through which he could accomplish so much. Ever interested in politics, he believed he could do more for the people of Santa Barbara as an editor than he could as a politician. And although he never sought public office, he did serve as a U.S. Senator, for a short while, as an interim replacement for the retired Senator McAdoo. His brief stay in Washington prompted the late Drew Pearson to write:

Senator Storke accomplished more for California in eight weeks than most professional politicians accomplish in eight years.

But undoubtedly, Thomas Storke's foremost accomplishment was his newspaper. Through the years, he consistently championed what he felt was good for Santa Barbara and California, and courageously opposed that which was not. From his crusading editorials against the Birch Society and the Southern Pacific Railroad for its involvement in California politics, to those actively seeking Federal moneys and the construction of local water projects, Thomas Storke consistently fought for what he thought was right—for himself, his community, and his country. He once said:

I believe that the first obligation of a newspaper editor is to his community . . . that (he) better than any single force, can form and develop character for his community . . . that with few exceptions, this is a lifetime job.

Known to his friends as "T. M.," to Californians as "Mr. Santa Barbara," and familiar to all by the forest ranger style hat he always wore, Thomas Storke projected a tough exterior image—but those who really knew him, knew him to be a warm and sensitive man. He was capable of towering rages and he ruled his newspaper in a manner often described as "benevolent tyranny"; but he was also capable of a rare gentility and softness and, as his biographer observed, he could "charm the scales off of a snake."

He liked people, and took pride in the friendships he established with many influential persons. He had a gut feeling for what he felt was right, and he savoured his ability to express himself forcefully and clearly. There was never any question as to what his opinions were, on anything and anyone.

Thomas M. Storke was not an ordinary man. He himself was an era, and along with his many accomplishments, he most certainly will be remembered for many, many years to come.

THE PRISONER-OF-WAR ISSUE

Mr. HRUSKA. Mr. President, the recent annual meeting of the National League of Families of American Prisoners and Missing in Southeast Asia has again focused attention on a subject never far from the minds of many Americans: Our prisoners of war and missing in action. The fact that meetings of the league have become regular, annual affairs speaks eloquently about the nature and extent of this tragedy, and about the inhumanity of the enemy we face in Southeast Asia.

On September 28 President Nixon addressed the league, as did Secretary of Defense Laird. Both affirmed in very strong terms their commitment to protect the welfare of the POW's and MIA's in whatever actions were being taken to bring the war in Vietnam to a close. As the President said, he has for some time "considered the problem of obtaining the release of our POW's and missing in action as being one that has Presidential priority."

Following the President's statement, Secretary Laird added that—

As long as Americans are held prisoners in Southeast Asia, as long as Americans missing in action have not been properly accounted for, our efforts must continue to keep this issue before the public in our own country and in the rest of the civilized world and to reinforce the demand for justice for these men.

Mr. President, I subscribe completely to the necessity for continued outcry on this subject. The more this Nation speaks with one loud and clear voice on this subject, the better our negotiating position with the Communists. And because of the rigidity of Hanoi on this issue, the more external pressure we can apply the better. For the Communists have made it clear through their cruelty and inflexibility that they are using these captive Americans as pawns in a political game. Their lack of response to President Nixon's proposal for a complete and unconditional release of all prisoners of war provides clear evidence of this.

Meanwhile, the negotiations go on, with every possibility being explored. And again, as it does periodically, the question of a firm withdrawal date comes up. Will the unilateral establishment of such a date by the United States bring about the release of those men being held prisoner by the Communists? This Senator is convinced more than ever that it would not.

The idea of a withdrawal date provides an appealing answer to the question of why Hanoi is so intransigent on this issue. Unfortunately, it is not the right answer. All available evidence points to the fact that a date for withdrawal would be a concession from us for which the Communists would not reciprocate. It is obvious that our POW's and MIA's represent a leverage potential to the Communists. Establishing a firm withdrawal date will only confirm this potential, and encourage Hanoi to use it still further. There is a good deal the Communists would like to have from America, and it does not end with our withdrawal from Southeast Asia.

Agreements mean very little to the enemy. They continue to violate the Geneva Convention with no qualms. And they will violate any other agreements when it suits their purpose—unless they are convinced that such violations are useless. This is our real goal. To convince Hanoi, through word and deed, that Americans are firmly united behind the President in his goal to achieve humanitarian treatment for American POW's, a full disclosure of MIA's, and eventual release of all captive Americans. We must make it clear that this country will do whatever is necessary to have these men returned.

It is obvious that we have not yet gotten this message across. One reason, of course, is that we are dealing with a tough and patient people who know how to wait. The people of the United States, on the other hand, are not known for their patience. And we still have a number of vocal people who, with every good intention, continue to insist on the announcement of a firm withdrawal date and undermine the President's bargaining position.

Mr. President, this Senator finds it difficult to counsel patience on the part of those citizens whose loved ones are missing or held prisoner. Only they fully feel the daily agony and suffering which accompanies such a situation. Yet I must indicate my respect, admiration, and pride at the courage shown by the members of the National League of Families of American Prisoners and Missing in Southeast Asia. I join in the remarks of Secretary Laird on September 28 when he told the members of the league that—

We pray that you will continue to have the strength to hold fast to the conviction that the waiting will end—and it will.

In the meantime, I urge all Members of this body and every citizen of this country to speak out against the Communist atrocities toward our men in their hands at every opportunity and in every form. We must show Hanoi, and the world, that we are united in this cause as in no other. Pressure of this sort is a language understood by the Commu-

nists. I believe it is a language to which they will eventually respond.

A glimmer of hope has been provided by the recent release of S. Sgt. John C. Sexton, Jr., by the Communists. Although it would not do to pin too much faith on the good will of the enemy, we can hope and pray that this release, and the reciprocal release by the United States of a North Vietnamese lieutenant, may lead to further prisoner exchanges. In the meantime, we must keep up the pressure.

DELIVERY OF WATER FROM RIO GRANDE TO PUEBLOS

Mr. ANDERSON. Mr. President, I have just received a letter from Mr. Diego Abeita, chairman of the Irrigation Committee of the Middle Rio Grande Pueblos. Mr. Abeita has attached a copy of a letter he wrote on September 30 to the governors of the six Middle Rio Grande Pueblos and to the members of the Middle Rio Grande Pueblos Irrigation Committee concerning delivery of water to the pueblos from the Rio Grande.

There has been a great deal of talk about mistreatment of the pueblos in the Middle Rio Grande and statements have been made that they are being shortchanged on water and have not been receiving what they need for their operations. I believe the attached report to the governors and committeemen is a very fine and concise report and very plainly points out that the Middle Rio Grande Pueblos have been receiving their share of the water from the Rio Grande.

Mr. President, I ask unanimous consent that the letter from Mr. Abeita and the above-mentioned letter to the Governors and committeemen be printed in the RECORD.

There being no objection, the letters were ordered to be printed in the RECORD, as follows:

ALBUQUERQUE, N. MEX.,
October 5, 1971.

Hon. CLINTON P. ANDERSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR ANDERSON: I am enclosing herewith a review of our water situation for the season 1971 pertaining to the Six Middle Rio Grande Pueblos, consisting of Cochiti, Santo Domingo, San Felipe, Santa Ana, Sandia, and Isleta.

We thought you would be interested in the factual review of our water year. We know that you are well informed on the subject of Indian water rights, and have always been interested in Pueblo Indian affairs.

We are rather disturbed by the distorted press releases which have confused a lot of people on the subject, and have been accelerated a move to create an independent Bureau called the Indian Legal Trust Council which we think is a very dangerous threat in our relations with the United States Government and particularly, the Department of Justice.

We ask your constant observance on this move.

Thank you for your attention.

Yours sincerely,

DIEGO ABEITA.

ALBUQUERQUE, N. MEX.,
September 30, 1971.

Governors and Committeemen, Six Middle Rio Grande Pueblos, Members, Middle Rio Grande Pueblos, Irrigation Committee.

GENTLEMEN: At this time we think it well to review our experiences in the irrigation year of 1971 which will be over in October.

First, you will remember that the Committee was authorized to ask the Secretary of the Interior to make the demand for storage of water for the irrigation season of 1971, in the El Vado Reservoir. This request was made the latter part of 1970, and you were furnished a copy of the letter to the Secretary.

Upon our request to the Secretary, Assistant Secretary Loesch immediately conveyed our message to the Conservancy District to store a sufficient supply of water for the six Pueblos to meet their needs. The Conservancy District then instructed the Reclamation Bureau to store water for the Pueblos.

The Reclamation Bureau then stored 23,500 acre feet in El Vado for the exclusive use of the six Pueblos. However, we had an adequate supply from the natural flow of the Rio Grande until June 14, when the stream became low ranging about 250 s.f. at Otowi.

On June 15, we then made a request through the Superintendent for the release of a supply of water from El Vado to meet our needs; however, the Conservancy District released 5,000 acre feet from Heron Lake—said water coming from the San Juan-Chama diversion. This was the first release that was ever made of this San Juan-Chama water, and it was delivered to the Pueblo lands on a priority basis. It lasted until about July 1, when Reclamation started to divert another 5,000 acre feet from Heron Lake and 5,000 acre feet from El Vado. About one-half of that release was delivered to the lands within the Conservancy District including Indian lands; of course, when the rains in the North supplemented enough to the natural flow, our needs were adequately met. This situation prevailed until September 14 when the East side of the Isleta lands were in short supply.

Therefore, on September 14, we requested another supply of water be made available from storage whereupon a flow of 250 s.f. in volume was started from Heron Reservoir, and this supply was intended to continue until there was an adequate amount for lands and to supplement this amount of our water from El Vado if it were needed for the rest of the season.

The flow continued through the Indian laterals, when on or about September 23, the rains added enough to the stream flow, and as of now, it still continues to suffice to mature our crops.

Some Observations and Conclusions are:

Comparatively, we think the six Pueblos have fared very well this season. Thanks for the cooperation we have had from the Office of the Secretary of the Interior—particularly from Assistant Secretary Loesch, the Middle Rio Grande Conservancy District, the Reclamation Bureau, and the Irrigation Department of the Bureau of Indian Affairs.

The Pueblo of Isleta is the Southernmost of the Rio Grande Pueblos and therefore is more sensitive to the proper administration of the Rio Grande's supply from storage and flow. They are now farming and irrigating approximately 4200 to 4500 acres, and it seems they have been adequately served this season as in other seasons.

Also, because of this situation, they are at a vantage point to reckon for adequate service. It seems that it has been a good year and a good yield from our river, our land, and our efforts. There is yet to be harvested some corn, partial cutting of alfalfa, chili, and some garden crops. The prospects look favorable.

We are astounded there has been so much squabble that we are stealing water from Indian Tribes upstream when we are the last on the lower end and we get only what they have left. This turmoil, we believe, is being generated by non-Indians who have no interest in our welfare nor any vested interest of the water of the Rio Grande.

We note in the papers that these persons are posing as "experts in water rights", "Indian experts", etc., and telling the general public what an "awful shape" we are in. After all, our well being depends upon us, ourselves, how expert we apply the vital substance our Mother, the river, gives us, feeds us, and raises us with, as we have done for a thousand years. We would be pretentious, indeed, if we went about and abroad assuming that we are experts on other people's affairs—yet, there are those who are doing so with us and our destiny—giving out distorted news releases; trying to make the public believe they are the saviours of the downtrodden, abused, and ignorant Indians in order to build their own fortunes and their own bureaucratic empire and to puff up their own egos.

We make our remark from long and hard observations that: Never has the horizon with the Indian people been brighter nor opportunities between greater and more abundant in all fields and the Government more generous in every area of our lives. Now, let's start our thinking from there, continue this progress that we have thus far made and worked so hard for.

I take this occasion to wish a big harvest and good health for you and all our people. I am glad to have been of service to you this season as in the past seasons and thank you for your confidence and cooperation.

Sincerely yours,

DIEGO ABEITA,
Chairman, Irrigation Committee, Middle Rio Grande Pueblos.

"A TIME TO ACT"—ADDRESS BY ATTORNEY GENERAL MITCHELL

Mr. MATHIAS. Mr. President, the Honorable John Mitchell, Attorney General of the United States, was both accurate and responsible when he said that—

> The Federal Government is clearly in a position to provide leadership among its fellow jurisdictions in metropolitan Washington.

The Attorney General spoke recently before the Metropolitan Washington Council of Governments and outlined some of the steps the Justice Department is taking to reduce the rate of crime in the National Capital area.

It is gratifying that he singled out for special praise the work of the Beltway Crime Conference, which was an example of cooperation between LEAA, the States of Maryland and Virginia, the District of Columbia, and numerous local jurisdictions.

I ask unanimous consent the complete text of the Attorney General's remarks be printed in the RECORD.

There being no objection, the address was ordered to be printed in the RECORD, as follows:

"A TIME TO ACT"

(An address by John N. Mitchell, Attorney General of the United States, before the Metropolitan Washington Council of Governments, University of Maryland, September 21, 1971)

Each of us can probably recite the statement attributed to Edmund Burke: "All that is necessary for the triumph of evil is that good men do nothing." Nowhere is this better applied than in the field of criminal justice.

I bring this up tonight not as an admonition, but by way of a compliment. In the Washington Metropolitan area, good men and good women have done something. The evil of crime has not triumphed.

In a large part of this region, crime is being reduced—not just slightly, but in the latest fiscal year, by more than 18 percent under the previous year. In the rest of the area, I firmly believe that the actions of good men and women will bring similar results in the

future. This is the subject that I would like to discuss with you tonight.

First let me define the Federal Government's role in this area. We have a clear responsibility in the District of Columbia.

When things are going in the right direction—and I believe they are in the area of criminal justice—we can share, along with people like Mayor Washington and Police Chief Wilson, some of the credit. And you can be certain that, if things go wrongly, there are whole armies of critics who are very generous in making sure that we share the blame.

The situation is very different in those areas of Maryland and Virginia that are part of metropolitan Washington. There, law enforcement and prosecution of regular crime—street crime—comes under state and local laws. The Nixon Administration is especially committed to halting Federal invasion of state sovereignty, and I intended to keep applying this policy in the field of criminal justice.

However, as a vital corollary, the Nixon Administration is also committed to strengthening the ability of the states to solve their own problems. As you know, this is largely a question of funds. Again speaking of criminal justice, this very need is served by the Law Enforcement Assistance Administration, a part of the United States Department of Justice.

There has been some feeling that LEAA has allocated too many funds to the District of Columbia and not enough to the suburbs. I would like to address myself to this concern for just a moment.

By law, 85 percent of LEAA funds must be allocated in block grants to the states, and the District of Columbia is considered to be in that category. Only 15 percent may be allocated directly to local agencies throughout the country in discretionary grants. This is one reason why the comparison between the District of Columbia and the suburbs may seem out of balance. Another is that discretionary grants must be compatible with state plans, and not all local discretionary proposals have met this criterion. Even so, five discretionary grants were made to suburban Washington jurisdictions in fiscal 1971. In addition, some of the needs expressed in local discretionary proposals have been or are being met through the block grants to the states, and through other discretionary grants to the State Planning Agencies.

I would like to add that LEAA's total budget continues to rise very decidedly from year to year. Consistent with the comparable needs of other localities throughout the country, we certainly intend to expand the LEAA support to suburban Washington.

Many are perhaps unaware of other support which the Department of Justice provides to state or local agencies. These include technical and training assistance by the FBI and by the Bureau of Narcotics and Dangerous Drugs. There is, of course, direct coordination between BNDD and local enforcement agencies in breaking up narcotics rings. But while our responsibilities in metropolitan Washington are substantial, they are also carefully circumscribed by law. There is on our part a conscious determination not to encroach on state and local authority, which is the main line of defense against general crime.

At the same time the Federal Government is clearly in a position to provide leadership among its fellow jurisdictions in metropolitan Washington. By leadership I mean proposing and urging new initiative in the battle against crime.

Let's look for a moment at where we stand in this battle. First, crime has dropped decisively in the District of Columbia, but it is still much higher than we want to see it. While good men have done something to reduce crime, they must keep on doing something and they must do more than ever.

Second, crime has continued to rise in the suburbs. In figures just gathered by the FBI, crime in the first six months of 1971 dropped 16 percent in the District of Columbia from that in the first six months of 1970, while in the suburbs it increased an average of 7 percent.

It is suggested that criminals have simply transferred their activity outside the District, with the implication that we have really accomplished little, overall. However, studies show that, while there is mobility among some criminals, it works in all directions, not just outward from D.C. Actually, crime appears to have risen in the suburbs of Washington at a slightly lower rate than in the rest of the country.

However, no matter what its rate of increase, it must certainly spur us on to new countermeasures. To find such countermeasures we can search in three directions—what has been done successfully in the metropolitan region, what has been done successfully in the District of Columbia, and what has been done successfully in other American cities.

First, within the Council of Governments, an important step was taken last January with formation of the Police Mutual Aid Agreement, covering civil disturbances and natural disasters. There is also a regional drug education program. There are other fields in which this kind of cooperation could be applied.

For example, BNDD has for some time urged the localities in this area to form a Metropolitan Enforcement Group. By this means, equipment, intelligence systems, and undercover agents can be shared. Since fiscal 1970, a means of funding such a program has been available from LEAA, and discretionary grants have funded successful programs in many other cities. I am pleased that a similar proposal for a narcotics task force was recommended at the recent Beltway Crime Conference. You may be assured of Justice Department cooperation in establishing such an organization.

Now, where cooperative effort require LEAA funds, it has been claimed that it is too difficult to get agreement among the various parties involved. I would point out, however, that some multistate LEAA programs are alive and well and working nicely in other parts of the country. In New England, as an example, there is a six-state LEAA grant in operation for organized crime intelligence and prosecution. Less than two weeks ago the State Planning Agencies of Maryland, Virginia and the District of Columbia signed an agreement to coordinate criminal justice planning efforts. Among other things, they agreed to consider the recommendations of the recent Beltway Crime Conference. Those recommendations, in turn, called for a number of steps to combine efforts and thus to increase effectiveness and decrease cost. The SPA's also agreed to explore with LEAA the possible need for a special discretionary grant fund against interjurisdictional crime in the metropolitan area. This is in line with LEAA's plans to direct its discretionary grants to fewer but larger programs that will have a real impact in a criminal justice field, and often in a regional framework. So I believe the situation in this area is today much more conducive to cooperation than it ever was before.

Next, what can we learn from the District of Columbia? Its success is generally attributed to the following steps:

An increase in manpower for police, prosecutors, judges and court staffs.

Installation of bright street lighting in high crime areas.

New laws and procedures to help in gathering evidence, to speed up the trial process, to reform and reorganize the courts.

Improved and expanded treatment for drug addicts.

And perhaps most important, the kind of strong support from the President of the United States that builds morale and generates public cooperation.

These have worked for the District of Columbia, and while the situation is different in each community, I believe most of them would be worth serious consideration by the Governments represented in this council. And in some instances, such as drug treatment, I would suggest that funds might be saved by a regional approach.

Finally, what do other cities tell us about their successes?

In the first quarter of 1971, crime dropped in 60 American cities of over 100,000 population. The police chiefs of these cities were among those attending a recent conference on crime reduction, at my invitation. The object was to pool our experiences to see what new approaches would be successful. Here are some of the concepts that might be applicable to metropolitan Washington:

One, more regionalization of certain police functions, such as training, data processing, centralized crime laboratories, and detective forces. This certainly confirms and extends the direction in which we are already going.

Two, more use of auxiliary police to handle public service duties, such as protecting schools and controlling traffic. This frees more highly trained, professional officers for the strict law enforcement functions.

Three, opening more opportunities for minority employment in law enforcement. Besides the obvious fairness of this concept I believe it is essential in keeping law enforcement from being blunted by any racial issue.

Four, more visible support for law enforcement by Government officials at all levels, by political parties, and by the news media. This can go a long way in generating greater public cooperation in bringing criminals to justice.

These are some of the highlights to be considered. The recent Beltway Crime Conference proposed others. My overwhelming feeling at this point is that we have now gone past the stage of conferring with each other and comparing notes. This was an essential step, but the time has come for the individual jurisdictions and the Council of Governments to take up the proposals that have come out of that initial stage. To paraphrase the prophet, there is a time to confer and a time to act. Now is the time to act.

In urging our fellow jurisdictions to move forward in this manner, I would like to point out that whether the crime figures are going up or down, those figures represent real-life suffering, real-life victims, real-life offenders who need correcting. We must go about our work with a sense of urgency.

Nor can I hold out any quick and easy solutions which, once adopted, can enable us to relax. The battle against crime is not a stop-and-go affair. Having started with a quotation from Edmund Burke, I would like to close with another from him that is less known, but even more to the point for all of us: "He trespasses against his duty who sleeps upon his watch, as well as he that goes over to the enemy."

I believe that the good men and the good women of the Council of Governments realize this full well, and they will continue to do not just something, but everything humanly possible.

FARMWORKERS FACE BIAS AND DISCRIMINATION WHEN THEY SEEK FEDERAL HOUSING PROGRAM AID

Mr. STEVENSON. Mr. President, one of the most severe problems facing migrant and seasonal farmworkers is finding an adequate, decent place to live.

To meet this need, several Federal pro-

grams have been enacted by Congress that have as their primary objective the improvement of rural housing conditions.

A recent report, "Studies in Bad Housing in America—Abuse of Power," by the American Friends Service Committee, and published by the Rural Housing Alliance, alleges that in addition to the lack of adequate funding for Federal migrant housing programs—an issue which I raised with my colleagues earlier this year—race prejudice and bias against the poor is practiced by program administrators in two rural areas in Florida. The charges of these two respectable and experienced nonprofit organizations are important, for in addition to their findings, the organizations note that not every farmworker in the country lives in such areas where persons knowledgeable about procedures to obtain housing are available to observe and document the discriminatory practices of Government officials.

Mr. President, I have today written the Secretary of Agriculture asking for his comments on the report. As chairman of the Migratory Labor Subcommittee, you can be assured that the subcommittee will continue efforts to direct Federal housing program aid to those persons in rural America who want and deserve a decent place to live. And, insofar as inadequate program administration frustrates the objectives of our congressional efforts, the subcommittee will investigate these practices and hold accountable any administrators who perpetuate housing injustices on the rural poor.

In the foreword to the report, Clay Cochran, executive director of RHA, concludes most appropriately by saying:

The Farmers Home Administration has a vital role to play in rural housing. It is the only federal agency whose structure and authorities enable it to deal more or less effectively with the housing needs of small town and rural people. With increased subsidies and additional administrative funds it could go far in meeting those needs, but we join with the AFSC in saying that if it is unwilling or incapable of ridding itself of bigotry and prejudice, then another agency must be created to take its place.

In view of the importance of this matter, I ask unanimous consent that a release from the Rural Housing Alliance that summarizes and highlights the important findings of the report be printed in the RECORD.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

RELEASE FROM RURAL HOUSING ALLIANCE NEWS SERVICE

Low-income families meet racial bias and discrimination when they seek Federal rural housing aid in two Florida counties, according to a report made public today by the American Friends Service Committee.

A 27-page study based on a two-year effort to help farm laborers and other low-income people obtain better housing in Palm Beach and Martin Counties recommends the elimination of the Farmers Home Administration if that agency continues to fail to meet the needs of rural poor.

The report was published by the Rural Housing Alliance whose Executive Director, Clay L. Cochran, said the situation in the two Florida Counties is not an isolated one. "The tragedy," Cochran noted, "is that in most areas where the poor are confronted by bigotry and discrimination there is no dedicated and knowledgeable AFSC staff to document their complaints."

The following examples are typical of the evidence presented in support of the AFSC charges:

The FmHA administrator in charge of the multi-county office in talking with local AFSC staff workers referred to a black loan applicant as a "nigger."

When 50 percent of a group of black farm workers applied for loans to build houses in a white area, they were turned away. But when thirty-five blacks applied for loans to build in an all-black area, only one was rejected.

The availability of interest subsidies was concealed when two low-income families from the South Bay area on Lake Okeechobee applied for help. They were told the interest rate on their loans would be 7¼ percent, the maximum rate. One family became discouraged and gave up trying to get a loan. The other persevered. One week before the loan was closed the latter family was told their monthly payment would be $118—one last attempt to discourage them. Finally, at the time the loan was closed the payment was adjusted to the proper level of $74 a month.

Low-income families are barred from the program in a variety of ways. Sometimes in determining the eligibility of applicants the administrator goes by his own morality standards rather than the applicant's loan repayment ability. For example, the official in charge of Palm Beach and Martin Counties will not make a loan to a family with illigitimate children. In other cases applicants are required to pay attorney fees and other loan closing costs out of their own pockets when legally such costs may be included in the loan.

Despite the fact that the law provides 90 percent grants for farm labor housing projects, the FmHA official for Palm Beach and Martin Counties, where heavy concentrations of farm laborers exist in shacks unfit for human habitation, has told the AFSC that the maximum grant will never be used.

The needs of the poor for better housing are also thwarted in the name of ecology. To obtain a FmHA loan a rural poor family must build a sewage disposal system which meets antipollution specifications which exceed the requirements of the local health department.

Self-help housing in which families provide the labor required to build their homes and cooperative housing are two authorized FmHA housing services. Neither has been used in Palm Beach and Martin Counties.

Ironically, this pattern of discrimination is being traced out in the shadow of some of the most expensive housing in the country. "In Palm Beach County, and surrounding areas," the report notes, "the building industry continues to build luxury condominimums and expensive subdivisions for people moving in from other states while the local poor and black, the labor force on whom the agricultural and urban communities depend, continue to be shunted aside and denied decent housing."

The American Friends Service Committee has been involved in helping the disadvantaged to press for decent housing for much of its history. AFSC pioneered the methods of self-help housing, beginning in the coal fields of Appalachia in the depression years of the 1930's.

"As a result of our grass roots involvement with people, we find ourselves often in the posture of watchdog," said Eleanor Eaton, national representative for Economic and Rural Affairs for the AFSC. "Several of our reports have contributed to bringing needed reforms in government procedures."

CONTROL OF THE PANAMA CANAL

Mr. FANNIN. Mr. President, for 57 years the United States has operated the Panama Canal to the benefit of all peaceful nations in our hemisphere.

It was the United States which made the sizable commitment and put forth the effort to build the canal. Our Nation to a large extent is responsible for the creation of an independent nation of Panama. We have paid just compensation to Panama for the Canal Zone. Our Government has been fair and generous in updating treaties concerning the canal.

Now nationalistic elements in Panama are once again agitating to wrest control of the canal from the United States. We must not allow this to happen.

Mr. President, the Phoenix Gazette published a very good editorial on this subject on October 12. I ask unanimous consent that it be printed in the RECORD.

There being no objection the editorial was ordered to be printed in the RECORD as follows:

PANAMA CANAL CANNOT BE LOST

When the Republic of Panama in 1967 tried to wrest control of the Panama Canal from the United States, a Democratic House member from Pennsylvania said: "The basic question . . . is not U.S. control over the Panama Canal versus Panamanian control, but American control versus (eventually) Communist control."

His statement is as true today as it was when the Johnson administration was ready to give in to Panamanian demands.

Panama has now taken its case to the United Nations and will argue, among other things, that the Canal Zone is a product of colonialism and therefore violates the U.N. charter. Panama seeks complete sovereignty and jurisdiction over the canal but would "allow" the United States to operate it.

If the dispute is allowed to become a U.N. matter, the outcome is predictable. Panama, once a democracy, now is a leftist dictatorship—ruled by military strongman Gen. Omar Torrijos. The U.N. General Assembly, where one nation—regardless of size—has one vote, contains the Afro-Asian bloc and the European Communist bloc. On the surface the Reds would be voting with Panama, but in reality they would be supporting Russia in its continuing effort to outflank the U.S.

In fact, it was leftist elements in 1967 that whipped anti-American feelings in Panama to fever pitch. Then the U.S., in an attempt to soothe Panamanian feelings, offered the nation a new treaty. Torrijos rejected the treaty, but the U.S. still is ready to offer Panama an up-to-date treaty. Since the Panama Canal was conceived, the United States has spent more than $5 billion in the zone. The waterway is Panama's chief economic asset, but to the U.S. it is a two-ocean lifeline—of tremendous importance to its world trade and of incalculable importance to national defense.

Negotiations lie between the U.S. and Panama—no one else. To lose control of the canal would be an unthinkable defeat.

ROLE OF SCIENTISTS IN 1969 SAFEGUARD ABM DEBATE

Mr. CRANSTON. Mr. President, there has been considerable newspaper commentary in the past few days—some of it has appeared in the RECORD—concerning a recently published assessment of the role of some of the scientists who took part in the 1969 Safeguard ABM debate.

The study, which was undertaken by the Operations Research Society of America—ORSA—concluded that several of the scientists who had opposed the deployment of Safeguard had been careless in their use of data or had otherwise acted unprofessionally.

The publication of this study has a number of serious implications. In particular, I am concerned for the continued viability of expert testimony that happens to be provided by persons outside the government.

I, for one, feel that the quality of expert advice made available to the opponents of ABM in 1969 was extremely valuable. Without it we would have been very poorly informed indeed on a subject that most of us, at the beginning of the debate, felt was so complex that it was exceedingly difficult to understand. It was not necessary to agree with all the conclusions of these outside experts; they may have made as important a contribution to responsible Congressional analysis by stimulating thoughtful rebuttal from the proponents of the weapons programs as they did with their own inputs; for that reason alone their efforts were well worthwhile, and I am, therefore, troubled by any efforts which could result in reducing the willingness of such experts to come forward with their advice, or of Senators to ask for it.

Mr. President, I ask unanimous consent to have printed in the RECORD an editorial published in the Boston Globe of October 2, 1971; a letter to the editor of that paper, written by Mr. Philip Morse, the first president of ORSA; and the text of comments on the ORSA report, written by Prof. George Rathjens, Steven Weinberg, and Jerome Wiesner.

There being no objection, the items were ordered to be printed in the RECORD, as follows:

[From the Boston (Mass.) Globe, Oct. 2, 1971]

SCIENCE AND MCCARTHYISM

Dr. Robert Oppenheimer who fathered the atomic bomb is dead and so, one might hope, are the antediluvian, witch-hunting tactics which so hounded that brilliant scientist in the Fifties. But now there is fresh evidence that such is not the case.

Instead, a controversy has arisen in the scientific community that could have a far more lasting and harmful effect on the future of our country than almost anything else short of the ever-present possibility of nuclear war which is at the heart of that controversy.

On Friday the Operations Research Society of America (ORSA), which is the principal professional society of cost-effectiveness analysts, released a very lengthy report by a seven-member ad hoc committee on professional standards, sharply criticizing a number of prominent scientists who led the attack two years ago against the Safeguard antiballistic missile (ABM).

The latter included Dr. Jerome B. Wiesner, president of the Massachusetts Institute of Technology; Dr. George W. Rathjens, visiting professor of political science at MIT; Dr. Steven Weinberg, a physics professor at MIT, and Dr. Ralph Lapp, author and nuclear physicist. All four enjoy excellent reputations, and so it is difficult to understand why they are now subject to an attack which seems in some ways to be personal.

The details of the attack are highly technical and difficult for the layman to understand. They are dealt with, and most competently in our view, in a 26-page commentary made public yesterday and signed by Drs. Rathjens, Weinberg and Wiesner. But what puzzles us is why the attack comes at this particular time. It was the result of a two-year study.

While it concerns testimony on the Safeguard ABM, it could have little relation in its purpose to that immediate issue. In 1969, by the tie-breaking vote of Vice President Agnew, the Senate had passed the Pentagon's bill for the deployment of Safeguard. And only last Wednesday the continued deloyment of the ABM at two sites had been approved by the Senate after little debate and few headlines. Why, then, this attack?

The general public, we believe, can gain some insight into the answer from knowing that ORSA, founded in 1952, has about 8000 members employed by universities, private companies and the government, and that the latter is a major purchaser of their services.

An interesting aspect of the ORSA committee's criticism is that it claimed an ABM opponent "ignored readily available classified material and used instead nonrelevant unclassified material in situations in which the more valid classified data would have substantially weakened his case."

Without going into the merits of this, one is tempted to ask whether Daniel Ellsberg might be right after all and whether all classified data on such matters ought to be declassified. The proponents of secrecy and of more and more super-missiles cannot have it both ways. Here they appear to urge that classified material be made public—but only for their purpose.

But this cannot be the real meaning of the attack, nor is it particularly germane, though it is surely interesting, that at least one member of ORSA's committee had every reason to disqualify himself, having been fired from a study directed by one of the very men he now attacks.

We call the reader's attention to a letter on this page from Dr. Philip M. Morse, a founder and former president of ORSA, objecting to the attack and saying that it "comes down on the side of those who advocate letting a super computer make all our policy decisions."

We have no doubt at all that Drs. Wiesner, Rathjens and the others will survive the attack quite well. What they, and all of us, are up against here is a state of mind, an intolerance if you will, on the part of those in power who hold contrary opinions. The attack on these scientists, we believe, is cut from the same cloth that has produced the attacks on the press and other media, and even on the Bill of Rights.

And so we welcome them to the club. It wins some and it loses some, but it has had a pretty good average through the long years of our country's history, and we think it rates a pennant of some kind or other.

[From the Boston (Mass.) Globe, Oct. 2, 1971]

PROFESSOR MORSE PROTESTS ORSA REPORT

I regret finding it necessary to protest the recent official approval of the Council of the Operations Research Society of America to a report which gratuitously, and I hope falsely, suggests that the society is on the side of ex Sen. Jos. McCarthy, is promilitary and supports the assumption that the expert always knows best.

I am talking about the impression the report is producing; the council must have known that occasional disclaimers and disavowals can't dispel the effect of the report on the general public, who will not read it carefully or will only know of it through the press.

The report, written by an ad hoc committee, appointed by the council of the society and approved by the council for publication, will be considered unfair, since it denounces, by name, persons who are not members of the society and who thus have had no means of controverting its effect, except after the fact.

They were allowed space in the report for counter argument, but they had no means of influencing the form of the report and were not represented on the council which approved its publication.

This already has given the impression that the society as a whole is against reduction of armament and is in general pro military; a few cautionary sentences in the preamble can't dispel this impression.

It implies that those with access to secret information must always be right in the assumption underlying their analyses and that those with opposing conclusions must either be dishonest or unscientific. By seeming to argue that there never can be honest differences of opinion regarding assumptions between scientists regarding questions of general policy, it comes down on the side of those who advocate letting a super computer make all our policy decisions.

I don't agree with any of these implications and I protest vigorously against council action which has put me in the position of appearing to approve them. If as I hope the majority of the members of the society feel the same way, then there must be something wrong with the way the society operates to make it possible for a council to place its members in so false a position. If I am wrong and the majority of members really do approve this way of settling a dispute between several ORSA members and several non-members, then I must regretfully sever relations with a society I helped to found, since it will have become a pressure group rather than a scientific society.

PHILIP M. MORSE,
Professor emeritus, MIT first president of ORSA, President-elect of the Physical Society of America.
CAMBRIDGE.

COMMENTS ON THE AD HOC ORSA COMMITTEE REPORT ON PROFESSIONAL STANDARDS

(By George W. Rathjens, Steven Weinberg, Jerome B. Wiesner)

In the fall of 1969 we were informed that the Operations Research Society of America was contemplating an investigation of certain aspects of the debate on the question of whether or not the United States should deploy an ABM system, in particular into our participation in the controversy. We were called twice in connection with the proposed inquiry, and on both occasions strongly advised against the Society's carrying out its inquiry. Finally, we wrote the Society explaining in more detail why we thought their proposal was ill-advised and why we did not wish to be involved. Our letter of December 22, 1969 follows:

"Mr. Wohlstetter's letter to you, asking for an inquiry into the professional conduct of those involved in the ABM debate, identified the three of us as having been contributors whose conduct he questions. We have therefore decided to respond jointly to your letter to one of us (Rathjens).

"We believe that the recent ABM debate was one of the most salutary developments in American political life in recent years and have been most pleased that we were in a position, along with many of our colleagues, to play what we have regarded as an informative and constructive role in that debate. Any general inquiry which would widen the public's understanding of the issues would be welcomed by us. However, we feel that for the Operations Research Society of America to carry out an inquiry into the ABM debate along the lines suggested by Mr. Wohlstetter would be absurd.

"Neither the debate as a whole, nor any significant part of it can be usefully judged according to the standards of operations research. This was not a debate between ourselves and Mr. Wohlstetter, or between

any fixed groups of scholars with recognized spokesmen. Rather, the burden of proof for the Safeguard deployment was carried primarily by members of the Administration, and it was their frequently shifting and contradictory statements with which ABM opponents had to deal. Also, there never was any general agreement on the technological facts underlying the debate. Rather, the calculations of ABM opponents had to be based on technical and intelligence information which was gradually being released by the Administration as the debate proceeded. Some of this information seemed to many scientists to be incorrect or incomplete. Therefore, the operations research aspects of the debate became inextricably linked with, and indeed probably less important than, judgments on such technical issues as the expected reliability of various system components; the inadequacy of the state of the art in computer technology; the reliability of cost estimates; the feasibility of alternatives to Safeguard; the efficacy of ABM countermeasures; the possibilities for re-programming offensive and defensive missiles; etc.

"The scope of the inquiry outlined by Mr. Wohlstetter is far too narrow. Any even-handed inquiry ought to look in considerable detail into the arguments and analyses offered by members of the Administration, particularly Messrs. Laird, Packard, and Foster. It should examine not only the technical details of these statements, but also such matters as the Administration's shifting rationale for its decision, its derivation of intelligence estimates, and the possibility that it selectively released classified information to make its case. Also important is the question whether or not Administration statements, regarding the threat to our total retaliatory capability and Safeguard's effectiveness in countering any such threat, were misleading to the Congress and the public. The role of outside consultants such as Mr. Wohlstetter was definitely secondary, but the extent to which they received support from the Department of Defense, and the use of Air Force aircraft to transport them to public debates, should also be examined. Most of these matters are far outside the scope of operations research, but to ignore them in an inquiry into the ABM debate would be to slant the inquiry and mislead the public.

"Finally, we are in doubt as to the resources of the Operations Research Society of America to carry out such an inquiry, and as to the procedures to be followed. What similar investigations have been sponsored by the Society, and what procedural guidelines have been established? Would all parties have the right to cross-examination of all other parties? How would you deal with classified material including the development of intelligence estimates?

"Do you intend to limit your inquiry to the conduct of members of your Society? Obviously not, if you propose to look into our participation in the debate since we are not members. (We would note in this connection that even the Spanish Inquisition reserved the charge of heresy for those who had been baptized!) If you do not intend to restrict your inquiry to the conduct of your membership, on what authority do you presume to expand it, and where do you propose to draw the line? Do you intend to inquire into the behavior of the Administration spokesmen—of Senators?

"In the light of these considerations, we question both the wisdom of an inquiry such as you propose and the standing and capacity of the Operations Research Society of America to carry it out. In our view the attempt is bound to result in a grossly inadequate inquiry that will reflect adversely on your Society and on the larger technical community. It could well appear to the nation as an ugly resurgence of those attacks on civil liberties and dissent which were far too common fifteen years ago. We urge you not to proceed with your proposed plan, and we certainly have no desire to be involved in it."

Despite our advice, ORSA went ahead with its inquiry and at the end of May of this year we received pre-publication copies of its report, and invitations to submit comments for publication with the report if we wished. We indicated that we had no reason to change our views regarding the absurdity of the enterprise.

Not wishing to become involved in debate with ORSA or its Ad Hoc Committee, we chose not to comment further. However, we believe that some public comment is required, and with that in mind we offer the following.

I. COMMENTS ON PROCEDURES OF THE AD HOC COMMITTEE ON PROFESSIONAL STANDARDS

1. We note first that, aside from some comments about Dr. John Foster's role in the debate, the Committee failed to address most of the major problems on which we commented in our letter of December 22, 1969, and that there is not a single reference to that letter in the report (although it is, as we requested, reproduced in an appendix to the ORSA Journal). We are curious as to whether our objections were communicated to the members of the Council of the Society and considered by them. We believe that virtually every criticism raised in that letter is substantiated by the report.

2. While the preface to the report indicates the Committee expended a great deal of effort over the period of a year in accumulation and study of relevant material it is clear that it did so with great selectivity. Specifically,

(a) it apparently looked at classified information very incompletely, despite our admonition that an even-handed inquiry would require that it do so in detail, including the development of intelligence estimates particularly in the light of selective release by the Defense Department;

(b) it did not comment at all on many of the documents and much of the testimony of those favoring the Administration's position. In particular it apparently did not look into, and in any case did not comment on or reference, such important statements and publications as the following: [1]

Books: *Why ABM?*, edited by Holst and Schneider, Pergamon Press; *Safeguard: Why the ABM Makes Sense*, edited by Kinter, Hawthorn Press.

Testing before Congressional Committee by: Frederick Seitz, Edward Teller, Eugene Wigner, Paul Nitze, Donald Brennan, Daniel Fink, Laurence O'Neill, William McMillan, Charles Herzfeld, and John Wheeler.

(c) although the committee states [2] that it based its analysis on publicly displayed material by the participants in the debate, it is clear that the Committee also considered some classified information [3] and private correspondence by those into whose conduct it inquired.[3a] However, it did not consider, or in any case did not comment or reference, other correspondence (e.g. attachments A and B) which dealt with some of the allegations made by Albert Wohlstetter the instigator of the inquiry. We offer two explanations for such omissions: (1) the Committee could not have supported its arguments had it done so; or (2) Mr. Wohlstetter did not make these materials available to the Committee since they would raise doubts about the validity of his case. We find it hard to be charitable about either possibility.

(d) Although its report does include some 1970 citations, the Committee claims that its inquiry was restricted to the period from the beginning of 1969 up to September 1969.[3b] Considering the time of release we do not understand why the study could not have looked into the 1970 debate more fully, except that had it done so the technical inadequacies of Safeguard and the inadequacy of the Administration's defense of it would have been more apparent.

More specific comments appear in Part II.

4. Finally, there is the question of whether the committee was properly constituted. We have in mind particularly the presence on it of Dr. Berger. He and one of us, Rathjens, had had a very serious difference of opinion on a previous occasion, the latter having felt obliged to relieve Dr. Berger of responsibility for a major study while both were employed by the Institute for Defense Analyses. It was obviously not a matter either took lightly, Berger having asked to be transferred from Rathjens' division and subsequently resigning from IDA. Under the circumstances we wonder why Dr. Berger did not disqualify himself from serving on the Committee; if he informed the officers and legal counsel of the Society of this history, and if he did why he was permitted to serve; and why in a report that deals with, of all things professional standards and ethics, there is not even a footnote indicating or explaining why he served despite these past differences or at least citing them so that the reader will be aware of them. This seems such a glaring example of a case for disqualification that we can not but wonder if the Society even bothered to look into the qualification of the Committee members to sit in judgment on this case. While our letter of December 22, 1969, anticipated most of the deficiencies in procedure (and scope) we thought might characterize the report, we could not have anticipated this (nor that the Committee would be so selective in its use of unclassified source materials).

II. SCOPE AND SUBSTANCE

1. While those opposed to deployment of Safeguard raised serious questions about its effectiveness, Administration witnesses and supporters were generally unresponsive to such questioning, made misleading statements about its effectiveness, and invoked secrecy to avoid disclosing the inadequacy of the system. Moreover, discussion of alternatives to Safeguard by Administration spokesmen and supporters was decidely inadequate. The Committee considered these questions only very selectively avoiding some of the major issues which were embarassing to the Administration. Some of the more glaring points are identified below:

(a) DoD spokesmen repeatedly claimed that Safeguard was well designed to defend Minuteman, and when it was pointed out by opponents that the MSR was particularly badly suited to its task and that a better defense could be provided with a dedicated hard-site design involving a different radar, the Administration and its supporters argued the impracticality of such an approach.[4] [5] [6] Subsequently, the limitations of Safeguard were admitted and serious effort is now underway to design such a defense.[7] The Committee failed to comment on this misrepresentation by the Administration. (see also item 6 below)

(b) The number of interceptors involved in Safeguard was, and is, so inadequate that modest incremental improvements in the Soviet offensive force level would overwhelm it. The Administration was repeatedly challenged to reveal these numbers of interceptors, but refused to do so on security grounds. This was done despite the fact that (1) observations of construction would make it quite obvious how many were involved, and (2) that before then—in fact at the time of the Administration's defense of the pro-

Footnotes at end of article.

gram—released cost figures permitted an estimate far more than sufficient for any Soviet (or Chinese) planning related to overwhelming the system. The Committee failed to comment on this flagrant misuse of security classification.

(c) As a related point, we call attention to the statement of Wohlstetter, Herzfeld, Libby and McMillan in which they compared Soviet requirements to destroy 70% of the undefended Minuteman force with requirements to destroy 95% of the defended force.[8] In that statement it is claimed that 800 additional Soviet reentry vehicles would be required for that task; and the cost of this increment is then compared with the cost of Safeguard with, however, there being no identification of what part of the 800 reentry vehicle requirement is due to the existence of Safeguard and what part is a response ot the different ground rules regarding the level of destruction to be achieved, 95% in one case and 70% in the other. The Committee did not comment on this.

(d) Secretary Laird claimed that the Safeguard phase I would provide a defense for ⅓ of the Minuteman force [9] when in fact for a variety of reasons this was simply not so as he later conceded.[10] The Committee did not comment on this.

(e) Defense spokesmen have claimed that a Sentinel/Safeguard defense could "deny" damage to this country from a Chinese attack, and the President claimed it could provide "a virtually infallible defense." [11] The Committee failed to comment on the extravagance of such claims despite the fact that they were vigorously disputed by opponents.

2. During the debate of 1969 not just two but at least three different positions emerged with respect to ABM. Some of the Administration's most vigorous supporters, e.g. Dr. Donald Brennan, not to mention some within the Administration and the Congress, supported Safeguard in large part because they favored a deployment of a large scale nationwide ABM designed to blunt the effects of a massive Soviet attack, a position directly contrary to that taken by the Administration. The Committee did not comment at all on these differences or on the analyses that lay behind them.

3. The committee repeatedly raised questions about cost estimates used by opponents as applied to Safeguard.

(a) It charged that one of us (Rathjens) failed to substantiate his estimates of Minuteman costs and failed to take account of the fact that costs commonly increase as programs move from the planning to implementation stage. It failed to comment on either Rathjens' letter to the Times of June 30, 1969, (attachment B) or on the Rathjens, Wiesner, Weinberg Commentary on Secretary of Defense Melvin Laird's May 22 Defense of Safeguard,[12] in which are cited references for costs; and it did not note that the costs cited were post-deployment costs.

(b) The Committee alleges that one of us, Rathjens, was in error in imputing the whole cost of Safeguard Phase I to defense of Minuteman, pointing out that there was an Administration intent to go further. There was no reason at that time to believe that the Congress would approve all of the Administration's program or indeed anything beyond Phase I or that the Administration would eventually even ask for the full twelve site deployment. It now seems very likely that there will be at most a defense of two or three Minuteman sites and that his cost estimates will have proved to be conservative. The Committee failed to recognize in this case, as it did in so many others, that the assumptions made by the opponents were quite as reasonable as those made by the Administration (and in hindsight more so). Despite the negative attitude toward an anti-Chinese defense of such influential people as Senator Jackson and the later negative report by the Senate Armed Services Committee, the Committee seemed persuaded that it was quite reasonable to assume that such a defense would follow the Minuteman defense deployment. The Commitee in this respect sems to have been remarkable uncritical of Administration assumptions.

4. The opponents pointed out that redeployment, early warning and improved alert capability was a more attractive approach to assuring bomber survival against SLBM attack than employing Safeguard. The Committee criticised the opponents for their position in this regard, but failed to comment on the fact that that is exactly the approach now being taken by the Administration.

5. A number of opponents argued that the Soviet Union could not successfully attack both our bombers (using SLBMs) and our ICBMs with SS–9s: that if Soviet ICBMs and SLBMs were launched at the same time there would be a 15 to 20 minute interval between impact of SLBM warheads on bomber bases and the impact of SS–9 warheads on our Minutemen during which time we could launch the latter; or if the Soviet designed their attack for simultaneity of impact we would have adequate warning from observing the Soviet ICBMs to launch the bulk of the bomber force. The Committee criticised the opponents' position arguing the feasibility of a pin down attack [13], but it did not deal adequately with the question of the large number of Soviet warheads that would have to be delivered; and it failed to note the low confidence that would have to attach to such an attack and the fact that U.S. Air Force spokesmen apparently regard it as infeasible.[14]

6. The Committee criticised some of the opponents for not discussing means by which the effectiveness of an ABM defense of Minuteman could be improved. We suggest that the Committee's criticism is misdirected in this regard in several respects. A number of the opponents made quite specific suggestions about improvements, pointing out that a more effective system could be obtained even with the same Safeguard components by using the MSR in a redundant mode for defense of a smaller number of Minuteman complexes and by procuring more Sprints at the expense of some Spartans. The opponents placed even greater emphasis on the possibility of a far more effective defense with components optimized specifically for defense of Minuteman bases, and many of them (and even some Safeguard supporters although not Mr. Wohlstetter) made recommendations strongly favoring research and/or development relating to such defenses. The Administration on the other hand virtually refused to concede the importance or feasibility of such approaches until 1970 after the opponents had clearly demonstrated the inadequacies of Safeguard and that a dedicated hard site defense was a more promising approach. We suggest that the Administration's reluctance in this regard was due to an unwillingness to face up to the mismatch between the Safeguard components and the defense of Minuteman, and to a reluctance to discuss quantitative expansion of Safeguard because of the likelihood that it would then be required to discuss the costs involved.

7. The Administration claimed that deployment in Montana and North Dakota was necessary for R & D purposes. Opponents claimed that this could be better done at Kwajalein particularly because of the possibility of launching re-entry vehicles into the latter area. The Committee did not consider this question or comment on the remarkable obscure language used by Secretary Laird in attempting to defend the Administration position.[15]

8. Opponents raised serious questions about whether Safeguard could be expected to function as well as the DoD claimed and in particular about the problems of computer software development. The Committee failed totally to address these questions.

9. The Committee, along with Mr. Wohlstetter and DoD spokesmen, dwelt at great length on the question of the possibility vulnerability of the Minuteman force to a possible Soviet attack by SS–9s, in our view to a disproportionate degree. At least as important were the questions of the complementarity and vulnerability of other components of our deterrent force and above all whether or not Safeguard would make much of a difference in the adequacy of the overall deterrent or even of the Minuteman component, issues to which supporters of Safeguard hardly did justice and which Mr. Wohlstetter in particular was quite unwilling to discuss.

We now turn to the question of the vulnerability of Minuteman to a possible SS–9 attack giving it the attention we do principally because it was with respect to our treatment of this question that the Committee has been most critical. The following are the principal allegations regarding analyses by us and some of our colleagues.

1. That, despite having access to official intelligence, we under-estimated the likely effectiveness of the SS–9 as a vehicle for attacking Minuteman missiles and in particular that

(a) Rathjens misread a chart presented in testimony by Secretary Packard.

(b) he asserted that use of the Packard chart and data presented at an earlier time did not permit an unambiguous determination of both hardness of U.S. missile silos and accuracy of Soviet missiles.

(c) Wiesner and Weinberg used a probability for destruction of Minutemen by SS–9 warheads that was too low and that they claimed the figure they used was from DoD sources.

(d) Rathjens, Wiesner, Weinberg and Pancfsky were unrealistic in dismissing reprogramming as a feasible Soviet tactic.

2. The opponents were in error in basing their discussion of Minuteman vulnerability in a mid-1970's time frame—that they should have used the late 70's as a basis since that was when Safeguard would be deployed.

With respect to access to classified information we do concede that we had such access. We further note that the classified estimates of SS–9 capabilities in the National Intelligence Projections for Planning at that time when the debate began were for a smaller payload than that assumed by Administration spokesmen and Mr. Wohlstetter. The much-discussed payload of three warheads, each of 5 MT was introduced later. Mr. Wohlstetter conceded [16] that he made calculations with the two other estimates (that were less favorable to his case), but he never in public testimony used such estimates. The Committee failed to comment on this singular omission. Despite our pointing it out,[17] the Committee also failed to comment on the fact that Mr. Wohletetter's estimates of effectiveness of an attack by Soviet missiles against U.S. Minuteman, were according to his testimony based on "Accuracies like those of the systems we are deploying new," [18] (April 1969) when in fact it was quite clear that he was using estimates that were based on systems that were only being tested at that time and which are only now being deployed (1971). The Committee also failed to comment on the fact that the DoD's first estimate of Minuteman survivability to a Soviet attack involving multiple warheads, and apparently the one that triggered Secretary Packard's concern, was 20%, much closer to our estimates than to those developed by Mr. Wohlstetter, Dr. Foster and Secretary Laird.[19] We have been curious why the Administration

Footnotes at end of article.

changed its position after Wohlstetter first raised his spectre of 5% survival, but the Committee's report throws no light on the subject.

There were, and still are, important technical reasons for discounting heavily the later DoD and Wohlstetter estimates. These points the Committee never addressed. First there are questions regarding the state of the art displayed by the Soviet Union in their SS–9 tests. These relate to such questions as the ballistic co-efficient of the Soviet reentry vehicles, the mechanisms for separating them, extent of separation, and indeed the question of whether the tested Soviet multiple warheads were true MIRVs or simply MRVs. There was not then reason to believe, nor is there now, that *with the technology displayed* by the Soviet Union, it could deliver three five-megaton warheads to separate targets with CEPs of the order of ¼ of a mile. The later DoD estimates, and Mr. Wohlstetter, in effect assumed the largest conceivable payload for the SS–9 and a CEP based on projected U.S. capabilities even though the latter involve a higher level of technology and penalties in terms of weight-carrying capabilities in order to achieve high accuracy and flexibility of MIRV delivery. Rathjens implicitly assumed sophisticated Soviet guidance and separation capabilities (similar to those of the United States) but lesser payloads than did the DoD (and the estimated effects of an attack on the Minuteman force using his assumptions were reasonably consistent with the effects of an attack assuming the payloads given in the NIPP at the time he made his estimates);* the other opponents assumed the larger DoD payloads but estimates of accuracy for those payloads that were, and are, more realistic for the mid–70 time frame than those of Mr. Wohlstetter, Dr. Foster and Secretary Laird. That these assumptions made by opponents were reasonable has apparently been supported by studies (not examined by us) done by a DoD/CIA contractor generally regarded as one of the most competent in the field—see attachment C.

The extremely high reliabilities and kill probabilities assumed by Secretary Laird, Dr. Foster and Mr. Wohlstetter (and by the Committee) for the non-reprogramable aspects of their analysis (greater than or equal to 95%) would be realistic, if at all, only in the event of test programs of an enormous scale. It is inconceivable (at least to us) that the Soviet Union would contemplate an attack against Minuteman missiles with only moderate confidence of success. Yet, to have, say, 90% confidence that a system would have a nonreprogramable kill probability of 95% or so would require *hundreds* of firings if only 3 or 4% inexplicable non-reprogramable failures occurred during tests. In the light of such problems it is not surprising that virtually every opponent assumed that at least two Soviet warheads would have to be targeted on each U.S. silo.

That still seems like a reasonable assumption; if sufficient reliability can not be achieved through systems design, *and confidence in it established by a suitable comprehensive test program,* the standard solution is redundancy, in this case the use of multiple attacks against a single target. The committee did not even comment on these problems although it later criticised opponents for neglecting to discuss the costs of Soviet programs that involve the testing of, in the Committee's opinion, *tens* of SS–9s).[20]

In its rather extensive discussion of reprogramming, the committee failed to deal adequately with the extreme difficulty, if not technical infeasibility, on which the opponents had commented, of compensating for failures in MIRV separation and/or guidance by replacing a single RV that had failed with one from another booster. It suggests this would not be difficult or wasteful citing a 50 mile spacing between RV in its exemplary discussion, a figure grossly inconsistent with the displayed Soviet technology.[21]

It is true that Rathjens read the famous Packard chart in statute miles and so indicated in a note to Wohlstetter. He later demonstrated to Wohlstetter (see Attachment A) that, considering the way he derived his estimates, the use of nautical miles leads to the same estimate of Minuteman vulnerability; and that by using the Packard chart and the Nitze figures one can get two different combinations of "hardness for U.S. silos—accuracy for Soviet missiles" depending on whether the Packard chart is assumed to be in statute or nautical miles. The Committee argues that the use of both the Packard and Nitze data can not be supported mathematically, that the Packard chart alone and an assumed CEP can be used to obtain a kill probability; and that the Nitze data can be used alone to derive a kill probability. The first point has been dealt with above; the second is true, but there was not at the time any unclassified basis for assuming a particular CEP; the third is also true as Rathjens demonstrated in his letter. The Committee's discussion of this problem makes it obvious that it either failed to consider the Rathjens letter or had not taken the trouble to understand what it said.

The Committee criticises the opponents for suggesting that their analysis of Minuteman vulnerability was appropriate to the mid-1970 rather than the late 1970 time frame. This is perhaps the most outlandish criticism of all. First of all at the time of the debate, DoD spokesmen were arguing that the threat about which they were concerned might appear as early as 1973.[22] Second, Secretary Laird was implying Safeguard would be helpful in 1973,[23] and Secretary Packard was claiming two Safeguard sites would be operational in early 1974—"late 1973 if we accelerate it."[24] Third, the committee itself carried out an analysis based on the early 1970s time frame.[25] Fourth, Senator Stennis, who had a major responsibility with respect to the whole issue, defined it as a 1975 problem.[26] Fifth, and most fundamental, the figure of 420 SS–9s used by the Administration in its analysis was consistent with the Administration's threat estimate for late 1974 or early 1975.[27]

It was a very carefully picked figure: had a moderately smaller figure been picked, even according to the Administration's analysis, too many Minutemen would have survived to make a case for Safeguard; had a somewhat larger figure been picked, Safeguard would have been demonstrably so inadequate as to make little difference. The assumption by Wohlstetter of a threat of 500 SS–9s with other parameters slightly different than those used by DoD spokesmen, raises the same problems. One might have expected any even-handed study by operations analysts to have been extremely critical about these selections of threats designed to make the system appear useful. The study did not take such a critical stance. It did not comment on the repeated statements of opponents that Safeguard, as it was being sold to the Congress and the public, would be useful, if at all, only over a very narrow range of threats; on the failure of DoD spokesmen and its supporters to respond to such criticism; and (as we remarked earlier) on the failure of the DoD to make public the number of interceptors in the Safeguard plan, which, had it done so, would have made Safeguard's inadequacies perfectly clear.

Recall that it was the DoD's projections of a Soviet SS–9 threat of 420 missiles in 1975 that was used in attempting to get support for Safeguard. What were the opponents to do? They could either discuss the threat in a 1975 time frame in which case it was quite reasonable for them to assume 1975 technology, or they could discuss it in terms of a later time frame when one might realistically have expected Safeguard could be fully operational but virtually useless if one accepted DoD's projections of the threat. The opponents did both. They did not deny the possibility that the Minuteman force would eventually be vulnerable to Soviet attack—indeed, some argued that that was likely to be the case and that Safeguard wouldn't make much difference—but they also argued that in a mid-1970 time frame a substantial number of Minutemen could be expected to survive an attack by a force composed of 420 to 500 SS–9s. The DoD and its supporters, on the other hand, assumed for Soviet force levels a 1975 estimate, but in other respects treated the problem in what amounts to a later time frame, particularly as regards technological developments and accuracy.

10. Finally, the Committee makes the observation that the analytical shortcomings of the Administration nowhere equalled the cumulative mass of inadequacies of the opposition. It says this despite its own admission that it looked primarily at only narrow facets of the problem,[28] and despite the fact that it looked to only a limited extent at classified evidence which would, in our view, have thrown further light on Administration errors. We have identified a number of errors by Secretaries Laird and Packard, the President, and Dr. Foster on which the committee did not even comment. In the light of our comments and the narrowness of its inquiry, we suggest that the Committee has no basis for its sweeping judgment about the overall merits of the analyses by the parties.

11. As regards matters of substance, we believe the errors and inadequacies of the arguments of the Administration, its supporters, and the Committee of Inquiry, can best be brought into perspective by a few very brief summary observations regarding present DoD programs and assessments of intelligence.

(a) The threat hypothesized by the Administration has not developed. The SS–9 force has not grown as projected, and the present projections of SS–9 effectiveness as a counter-force weapon against the Minuteman are almost certainly more consistent with our estimates than with those used by the Administration and its supporters.

(b) Despite early Administration remarks denigrating hardening as an approach to improving Minuteman survivability, Administration spokesmen concede that increasing silo hardness through upgrading is the cheapest way to improve Minuteman survivability,[29] and such upgrading is now underway.

(c) We now seem to be prepared to rely on redeployment, early warning and an improved alert status as a defense for bombers. There appears to be little interest in defense with Safeguard.

(d) Similarly, one hears little, if any, talk of using Safeguard as a defense against China (and no talk of its providing an infallible defense.)

(e) It is now recognized, even in the DoD, that the MSR is the Achilles' heel in Safeguard, and there are serious efforts underway to design a dedicated hard site defense which would rely on redundant less expensive radars as recommended by many of the opponents of Safeguard.

(f) It is now conceded that Safeguard will be an inadequate defense if SALT fails whereas originally it was argued that it was needed in case SALT failed.

III. CONCLUDING OBSERVATIONS

We do not claim infalliability. We made mistakes, but we believe not serious ones: such errors as we made were a reflection of the fact that, with limited time and resources, we devoted our efforts to the issues

Footnotes at end of article.

of fundamental concern. We believe the Administration spokesmen, and to an even greater degree Mr. Wohlstetter and the ORSA Committee, avoided many of these issues, preferring to dwell on minutiae.

We note with interest the statement in the preface of the report. "It is not anticipated that ORSA would repeat such an exercise." [20] We should hope not for it is totally inappropriate for a professional organization like ORSA to lend itself to becoming an instrument on one side of a political debate of this kind.

This does not mean that we believe ORSA should not be concerned about professional standards and ethics. We believe it should be, but that it should restrict its purview to its own members. In the light of the performance of its Ad Hoc Committee on Professional Standards, we find it hard to believe that any professional group in this country is in greater need of scrutiny and reform.

Finally, we have not commented on all of the points raised in the ORSA Report. We feel no obligation to do so. We have other demands on our time. As it is, we regret having to have spent even the limited time we have in commenting on the ORSA report. We have done so both in self-defense and so that the public may be informed as to the character and quality of what we regard as a very ugly incident—we hope not the harbinger of a trend nor a precedent that will be followed.

FOOTNOTES

* This page replaces an earlier version in copies circulated prior to Oct. 5.

[1] The reason for the ORSA Committee's focusing its attention on us (and Drs. Panofsky and Lapp) is not obvious from the ORSA Report. We believe it is because Albert Wohlstetter in his letter which instigated the inquiry, and in documents referenced in that letter, identified us as the ABM critics whose performance he wished to challenge. The paragraphs in which this is done and the references are omitted from the version of his letter published in the ORSA Journal in Appendix IV. It is not clear to us whether this omission was made to save space or to minimize the likelihood that readers might view the enterprise as an effort by Wohlstetter to use ORSA in what has amounted to a personal vendetta.

[2] ORSA Report, p. 1175.

[3] Ibid, p. 1191.

[3a] Ibid, p. 1181 and 1183.

[3b] Ibid, p. 1176.

[4] Foster, Senate Armed Services for FY 1970, p. 194.

[5] Packard, Ibid, p. 1681.

[6] Nitze, Ibid, p. 1148.

[7] Foster, Statement on Safeguard, 24 February, 1970, p. 2. Gilstein, House Defense Appropriations Sub-Committee for FY 1971, Vol. 6, p. 1 59.

[8] Statement on the Effectiveness of the Safeguard ABM System, Submitted to Senator Henry M. Jackson, August 10, 1970.

[9] Laird, Senate Foreign Relations Sub-Committee on Disarmament, 1969, Part I, p. 180.

[10] Laird, House Defense Appropriations Sub-Committee, May 22, 1969, p. 46.

[11] News Conference, January 30, 1970.

[12] Rathjens, Wiesner, and Weinberg, Commentary on Laird's May 22 Defense of Safeguard, p. 13, footnote 4.

[13] ORSA Report, p. 1216.

[14] Lt. Gen. Glasser, House Armed Services for FY 1972, p. 4523.

[15] Laird, House Defense Appropriations Sub-Committee, May 22, 1969, p. 63.

[16] Letter of September 10, 1969, to Senator Stuart Symington.

[17] Senate Armed Services for FY 1970, p 1454.

[18] Ibid, p. 1264.

[19] Senate Armed Services for FY 1970, p. 127.

[20] ORSA Report, p 1236.

[21] Ibid, p 1207.

[22] Laird, Senate Foreign Relations Disarmament Sub-Committee 1969, p 198.

[23] Ibid, p 219.

[24] Ibid, p 276.

[25] ORSA Report.

[26] Senate Armed Services for FY 1970, p 1135.

[27] Packard Chart, Ibid, p 177.

[28] ORSA Report, p 1179.

[29] Lt. Gen. Glasser, House Armed Services for FY 72, p 4521.

[30] This comment appeared in the draft preface which we received some time ago. In the foreward to the report, as released, the language is changed to read "ORSA hopes it will not be necessary to conduct additional investigations of this nature."

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY,
Cambridge, Mass., June 30, 1969.

Mr. ALBERT WOHLSTETTER,
University of Chicago,
Chicago, Ill.

DEAR ALBERT: After your last letter to the Times, I am not sure whether you are confused about my calculation of Minuteman vulnerability to an SS–9 attack or are simply intent on beating a dead horse. Rather than further impose on the Times, I thought I should try to deal with the question in a letter to you.

First of all, recall the Nitze figures: 1.2–1.7 hard silos destroyed with a payload of ten 50 KT warheads. I used a median value 1.45 and from that get a SSK of 0.145 (Note: obviously Paul's figures were for a reliability of 100% considering the context).

One can read the Packard chart assuming the miles referred to are statute in which case I get a hardness of 480 (though a few parts of the chart don't fit this perfectly). Using that and an SSK of 0.145 for 50 KT, I get a CEP of 1430 feet. For 1 MT, a hardness of 480 psi and a CEP of 1430 feet, I get an SSK of 0.68.

Alternatively, one can read the Packard chart assuming the miles are nautical in which case I get a hardness of 320. Using that and an SSK of 0.145 for 50 KT, I get a CEP of 1650 feet. For 1 MT, a hardness of 320 psi, and a CEP of 1650 feet, I get an SSK of 0.68.

Or alternatively one can simply forget about the Packard chart and compute an SSK directly from the Nitze figures using cube root scaling.

$$SSK = 1 - (1 - 0.145)\ (1000/50)^{2/3} = 0.683$$

Multiplying 0.68 by the reliability I assumed of 0.75 (and, assuming as I did, no reprograming), I get an overall kill probability for a 1 MT warhead of 0.51. With two warheads per aim point and 1000 aim points, I then compute 24% survival (which I rounded off to ¼).

Now I know you disagree with me on retargeting, on the payload, and on the relevance of the Nitze data, but let us not disagree on how to do the calculation. At the time I did the calculation my assumptions seemed to me reasonable, and as good as any that could be supported using authoritative, unclassified information then available. They still don't seem to me too bad, though the payload of the SS–9 now appears to be larger than the intelligence estimates carried at that time. In any case, except for the point about retargeting, the differences between us about Minuteman vulnerability are trivial by comparison with those we have about Safeguard utility.

The mid-late 1970's question hardly deserves much comment here or in the Times. You yourself said your calculations applied to 1976 or 1977 (page 12, your statement) and that by the late 1970's the Soviets could have a higher degree of MIRVing (p. 13). I do not dispute that the SU could have a capability for destroying the bulk of the Minuteman force by the late 1970's, or for that matter even by the mid 1970's if they wish to do so. What I do dispute is that it is likely that they can do it with 420 or 500 SS–9's by the mid-1970's or that Safeguard is either needed or a very good defense for Minuteman.

Our differences on costs seem to me of more general interest and so I am sending the Times the enclosed letter.

Sincerely yours,

GEORGE W. RATHJENS.

JUNE 30, 1969.

THE NEW YORK TIMES,
New York, N.Y.

TO THE EDITOR: In hearings on the 1964 Defense Department budget, former Secretary of Defense McNamara said, "the cost per missile (for Skybolt) . . . would approximate $4 million per missile, very close to the incremental initial investment cost for a Minuteman missile, complete with its blast resistant silo" (presumably this was for Minuteman I). In defense of the 1966 budget, he gave $1.3 billion as the "estimated five year cost for an additional 200 Minuteman II missiles".

Both figures having been produced after the deployment was well along, it seems reasonable to assume that they are relatively "hard" figures—certainly firmer than those now being used in discussing Safeguard.

My figure of $4 million per missile for the marginal cost of a Minuteman is consistent with the first of Mr. McNamara's two figures, and probably reasonably consistent with the second considering that the latter includes five years of operations, maintenance, replacement, etc., whereas my estimate did not.

Mr. Wohlstetter charged in your June 15 issue that I was "casual" in my use of costs and stated in your June 29 issue that "the relevant marginal systems costs are twice that or more". While I, and I suppose possibly even Secretary McNamara, may have been in error in using such figures, Mr. Wohlstetter has not supported his charges by citing any other authoritative figures available at the time I made my estimate.

I have dealt, I believe, adequately with the other differences with Mr. Wohlstetter regarding Safeguard and Minuteman in these columns and in private correspondence.

Sincerely yours,

GEORGE W. RATHJENS.

NOTE.—This was not published by the New York Times but was made available to Albert Wohlstetter.

RUSSIAN MISSILE FAULTED—STUDY FINDS SS–9 WARHEADS LACK ACCURACY

(By Michael Getler)

A new study sponsored by the Pentagon and CIA estimates that multiple warheads flight-tested thus far with the giant Soviet SS–9 intercontinental missiles are not accurate enough to knock out U.S. Minutemen ICBMs in a surprise attack, according to informed government sources.

Furthermore, the study is said to estimate that the warhead accuracy probably cannot be improved enough with the techniques now being used to achieve a first-strike capability.

The study, which was completed in April, was carried out for the government by TRW Inc., a large defense contractor in California with an excellent technical reputation.

Informed officials say there is no evidence that the Soviets have flight-tested any new kind of multiple warhead for the SS–9 beyond those discussed in the study.

While some additional tests of the big missile are expected later this year, officials say they are uncertain whether these flights will reveal a new and more accurate version of the SS–9 or will merely be tests of existing

missiles launched from protective silos the Soviets are building.

In any event, some government weapons analysts view the new study as lessening still further Pentagon fears that by 1975 the Soviets could deal a surprise knock-out to all but a handful of America's 1,000-missile Minuteman force.

Last year, TRW made a similar technical assessment of the SS–9 for the Pentagon. In that study, officials say the firm gave a "lukewarm" endorsement, based on earlier SS–9 testing, to the idea that the Soviet triplet warheads could be of the MIRV type in which each of the three warheads can be sent to a separate Minuteman silo with enough accuracy to knock it out.

The new study, officials say, reverses that earlier opinion that MIRVs were involved.

Weapons experts in a number of government agencies, including the Pentagon, estimate that it would take the Soviets two to three more years to perfect and begin deployment of a more accurate MIRV. It would then take several more years to equip the entire force of SS–9s, which now numbers about 288.

AGREEMENT SOUGHT

The Pentagon has estimated that the Soviets would need some 450 such MIRV-equipped missiles to wipe out the Minuteman force. At the Strategic Arms Limitations Talks, the United States is trying to work out an agreement that would limit the SS–9s to about 300.

The new study also appears to contradict recent Pentagon estimates that the Soviets will have a MIRV "capability" in 1972. However, some officials say it is true that the current Soviet multiple warhead system could be viewed as a MIRV, except that it is not a very good one.

The Soviets are said to use a system of small rails inside the nose cone of the SS–9 to launch the three warheads to separate targets that are reasonably close together. By varying the time each warhead moves down these rails, the missiles can be made to land in a pattern that has, in tests, resembled the layout of Minuteman silos.

This, at first, led some analysts to believe that the Soviets were developing a MIRV to attack Minuteman in a surprise first strike.

Now, however, it has apparently been concluded that the technique is both inaccurate and also inflexible because the Minuteman patterns vary widely.

The U.S. MIRV now being deployed on the Minuteman and Poseidon submarines is more sophisticated, using a so-called "space bus" with its own guidance system to target each warhead accurately in the bus to a widely separated target before it is launched.

LESS POWERFUL WEAPONS

The U.S. MIRVs, however, are only a fraction as powerful as the huge Soviet weapons, and the Pentagon has declared that this lack of nuclear punch also means that Minutemen are no threat to Soviet missiles buried in underground silos.

On Capitol Hill yesterday, the SS–9 also figured in sharp questioning of high-ranking Pentagon officials by Sen. Stuart Symington (D–Mo.).

Symington, at an open session of a Senate Foreign relations subcommittee on disarmament, claimed that Pentagon witnesses were saying different things about a possible U.S.-Soviet agreement at SALT than had the chief U.S. negotiator, Gerard Smith, before the same committee in a closed hearing on Tuesday.

Appearing at yesterday's session was Adm. Thomas H. Moorer, Chairman of the Joint Chiefs of Staff, and Dr. John S. Foster Jr., the Pentagon's chief scientist.

Both officials, under questioning, said that any SALT agreement must include simultaneous limitation on offensive missiles as well as ABM defense systems.

"Your position," Symington said to Foster, "is not the same as Smith's." Symington said he understood Smith to say in closed session that the hoped-for SALT agreement would provide for an ABM agreement while talks continue on the offensive weapons question. Foster said it was his understanding that "any controls would go in simultaneously."

Symington pressed Foster to say if Smith's interpretation was "right or wrong" Foster hesitated, then said he did not feel it was helpful "to get engaged in semantics."

Foster said he did not think there were any differences in his understanding of the hoped for agreement and Smith's, although defense officials later conceded privately that it was not yet clear if the Soviets completely understood or agreed to U.S. goals on limiting offensive missiles.

After Moorer mentioned the SS–9 threat against the "survivability of our ICBMs," Symington, who is also a member of the Armed Services Committee—including the CIA subcommittee—said he did not agree with "the assessment that the SS–9 was accurate enough for a first strike."

NOMINATIONS TO THE SUPREME COURT

Mr. FANNIN. Mr. President, under our Constitution the Nation's Chief Executive has the responsibility of nominating Justices of the Supreme Court.

The Senate has the duty of advice and consent, to confirm or reject the nomination.

President Nixon at this time is working on the selection of two Justices to fill vacancies on the Supreme Court.

Already we have experienced much sound and fury on the subject of who should and who should not be nominated for the Court. The prospect of another inquisition has caused one very capable and honorable man to ask the President not to consider him for the Court.

Mr. President, I am very concerned about what is happening in relation to nomination of Justices and other high Government officials.

Powerful liberal pressure groups are determined to scuttle the appointment of any Justice who has not proven to be an advocate of the liberal philosophy. These groups are demanding that before any new Justices be seated, the nominees embrace the liberal decisions made by the Court in recent years and pledge to keep moving in that direction.

If the nominee does not have impeccable liberal credentials, the cry will go out that the President has made another divisive appointment.

Mr. President, it is not the President who is divisive but those who try to drive a wedge between the President and the people.

One editorialist this week lamented the fact that President Nixon might choose a Justice who does not have an established national reputation. In other words, if the nominee does not come from the big metropolitan centers or more specifically from the eastern megalopolis, he is not likely to have much legal competence.

As much as some of those in government might not like to admit it, there are intelligent people who have never been in Washington or New York.

It is my belief that there are many lawyers and judges in small cities or towns around this Nation who qualify to be Justices and would prove to be great Justices.

Another point I would like to make is that I do not believe the President has any obligation to seek the advice of anyone before he makes a nomination. He certainly does not have to have the approval of the ABA, the AMA, the NAACP, the AFL–CIO, or any other combination of letters. If he wishes to consult with the leaders of one of these groups, or all of them, then it is well and good. But he has no obligation to seek advice from any group other than the U.S. Senate, and we will give him plenty of advice—we always have.

Mr. President, I am not saying that these groups do not have a right to state their opinions on the nomination. Certainly they do and they will have a chance to do so before the Senate Judiciary Committee. What I am saying is that I am concerned when too much prominence is given to the objections of some group because the leader is piqued that he was not consulted beforehand.

To demonstrate how shallow and mistaken some of the opinions of pressure group leaders can be we need only look at the newspaper accounts from early this week.

There was speculation that one of the distinguished Members of this Senate may be nominated to the Court. But the spokesman for one liberal group said that the Senator simply could not understand the problems of people less fortunate than himself.

Mr. President, I do not think I have to point out the fallacy of this statement to Members of this body. I know of no one in the Senate, or in politics, who started any further down the economic ladder than our esteemed colleague. He got where he is through hard work and determination. Who could know the problems of the less fortunate any better than the man who has been there? There may be times when I do not agree with the Senator, but I certainly admire his tenacity, his devotion to his duty and his country, and I have no reason to believe that he would not make a fine addition to the American judicial system.

Mr. President, it is my hope that we can consider these nominations with some calm deliberation. Nominees are open to scrutiny and must expect close examination of their legal competence. But they should not be subjected to high pressure campaigns that are designed mainly to smear their character and sway public opinion against them.

SCHOOL LUNCH REGULATIONS

Mr. HART. Mr. President, almost 2 years ago, the President pledged that every needy child in America's schools would receive a free or reduced price lunch. Congress took the President's pledge to heart and passed a new school lunch law in 1970 guaranteeing a lunch to every needy child.

When Congress made that guarantee, it also made clear that cost was not to deter us from fulfilling the goal. Feeding

our hungry children was now the goal. It would cost what it would cost.

During the last school year, participation in the school lunch program rose from 5.8 million to 7.3 million children. This year, it was fully expected that participation would continue to expand to over 9 million needy children.

It was puzzling to me that the Agriculture Department did not request additional funds to pay for that expansion. In fact, I recommended to the Appropriations Committee that additional funds be made available.

When the Agriculture Department moved to reduce the Federal rate of support for the program just before the 1971–72 school year, my puzzlement turned to shock. I could not believe, after the President's personal pledge and the commitment by Congress, that an executive agency would move arbitrarily through the regulatory process to deprive needy children of lunches.

Following the Department's move to reduce the Federal rate of support, I had the privilege of sponsoring, along with Senator COOK, a letter that was signed by 44 Members of the Senate. This letter urged the President to order the Department to provide more support for the lunch program, not less.

I believe this letter played a role in the Department's decision last week to raise its support level per lunch from 35 to 45 cents. Unfortunately, at the same time the Department announced that decision, it also announced that it was instituting a new maximum nationwide income eligibility standard of $3,940 for a family of four.

In effect, this new maximum lowered eligibility levels in 44 States and, in one abrupt swoop, knocked out of a million and a half needy children from the school lunch program.

Mr. President, this new attempt by the Agriculture Department, obviously at the direction of the Office of Management and Budget which is, unfortunately, not subject to congressional supervision, to cut back on this program is inexcusable. Indeed I question its legality.

When Congress enacted Public Law 91–248 in 1970, it intended that the national eligibility standard established by the Secretary of Agriculture should be a minimum standard, a floor that States and localities could exceed where individual economic conditions dictated.

The Agriculture Department recognized as much last school year and the beginning of this school year by specifically approving the higher standards in the 44 States. Then suddenly last week, the Department reinterpreted—wrongly and in my view illegally—the law passed by Congress.

For that reason, we have today sent a second letter to the President carefully explaining the meaning of Public Law 91–248 insofar as eligibility levels are concerned. Lest there be any doubt as to what the Senate meant when it voted Public Law 91–248, I want to note that 58 Senators have agreed to sign this letter.

Hopefully this letter to the President will serve to remind the Department of Agriculture that when the Congress says it wants this Nation's hungry schoolchildren fed, the Congress means what it says. It does not mean that only some of the hungry should be fed. It does not mean that senseless lines should be drawn between some poor children and other poorer children. It means only and exactly what it says—feed all the hungry and all the poor of the Nation's needy schoolchildren.

I pray this unfortunate controversy is concluded, that no further letters will be necessary. Hungry children do not need any more regulations from the Department of Agriculture or letters from the Senate. They need food.

Mr. President, I ask unanimous consent to have printed in the RECORD the following letter to the President sponsored by myself and Senators WILLIAMS, CRANSTON, COOK, and CASE, and signed by 54 Senators.

There being no objection, the letter was ordered to be printed in the RECORD, as follows:

U.S. SENATE,
SELECT COMMITTEE ON NUTRITION
AND HUMAN NEEDS,
Washington, D.C.

THE PRESIDENT,
The White House,
Washington, D.C.

DEAR MR. PRESIDENT: We are writing to you once again out of a deep concern regarding the school lunch regulations which are being issued this week by the Department of Agriculture. On September 9, 1971, forty-four Members of the United States Senate wrote a letter to you objecting to the proposed regulations, primarily because of the proposal to reduce the reimbursement rate for free and reduced price lunches to a statewide average of 35 cents per lunch, and because of the failure to provide for continuing the authority to transfer funds from Section 32 to the School Breakfast Program. Recently, it was announced that the Department would strike the 35 cent requirement and substitute a figure of 45 cents. We think that this is certainly a step in the right direction and the indication that the Department of Agriculture was prepared to follow through on our mutual promise to feed the Nation's hungry schoolchildren brought a reaction of considerable joy and confidence.

Yet, at the same time, we now learn that the Department intends to arbitrarily limit the eligibility of poor children for the program by reversing its past policy by interpreting the national eligibility standard instituted by Public Law 91–248 as a ceiling rather than a floor on participation. Such an interpretation violates both the letter and the spirit of the National School Lunch Act.

The national eligibility standard for receiving free or reduced price lunches was one of the major changes in the National School Lunch Act made by Public Law 91–248. The law states that "any child who is a member of a household which has an annual income not above the applicable family size income level set forth in the income poverty guidelines shall be served meals free or at a reduced cost." (42 U.S.C. 1751 § 9). This eligibility standard was explained on the floor of both Houses of Congress and in the Conference Committee Report on H.R. 515, the legislation which promulgated the requirement.

During the Senate consideration of this legislation it was made clear that the intent of the "*minimum* eligibility standard" (emphasis ours) was to "clarify eligibility for all schools. Children and parents would know precisely where they stood. Yet, within the minimum standards set, state and local school districts would still make the determination of eligibility." (Congressional Record; vol. 116, pt. 4, 4319.) The Conference Committee Report on H.R. 515 also made clear the intent of Congress that this eligibility level be a minimum when it stated that "the Conference amendment to the eligibility standard for free and reduced price lunches makes it clear that every child from a household with an income below the poverty level shall be served free or reduced price meals . . . It should be clear that, although the poverty guideline is the only mandatory national standard, children from a family meeting other criteria shall also be eligible for free or reduced price school lunches." (Conference Report 91–1032).

In explaining the Conference Report on the floor of the House, Representative Quie, a member of the Conference Committee, explained that "the local school authorities retain their authority to provide free or reduced cost lunches for children who come from a family whose income is above the poverty lines." (Congressional Record; vol. 116, pt. 10, p. 13991.) In a colloquy with Senator Talmadge during Senate consideration of the Conference Report Senator Javits also made this clear when he said ". . . and very important, the poverty level standard is a minimum level and is not a ceiling. Therefore children who meet the poverty level criteria in a state like New York where the poverty level is above the national level, would still get free and reduced price lunches." (CONGRESSIONAL RECORD; vol. 116, pt. 10, p. 13603.)

In addition, it must be clear that USDA in the year following the passage of Public Law 91–248 very well understood this intent of Congress. The school lunch regulations for the school year 1970–71 provide eligibility levels over and above the minimum standard in this way:

Any criteria included by a school food authority in addition to the minimum criteria specified in this section shall relate to providing free or rdeuced price lunches to children who would not be eligible for such lunches under such minimum criteria. In no event shall any such additional criteria operate or be applied so as to deny free or reduced price lunches to children who qualify for such lunches under the minimum eligibility criteria required by this section. (Federal Register; Title 7, Chapter II, Part 245 § 245.3(b).)

The purpose of the regulation cited above was to make it clear that all children under the minimum level would be served a free or reduced price lunch and that any additional criteria could be used only if it served to increase the participation rate and could not be used to deny a lunch to a child who would be eligible solely on the basis of income and family size. Thus in its regulations the Department has clearly made provision for local authority to adjust the minimum eligibility standard upwards based on variations in such things as cost of living, geographical peculiarities and so on.

It is well established, then, that the intent of Congress in providing a minimum national eligibility standard was to see that all children under this level shall be served a free or reduced price lunch and that those who may require such a lunch because of any of a number of other circumstances, as determined by the state or local school authorities, shall be covered by the program as well.

An interpretation of the eligibility standard as a ceiling rather than as a floor will serve to eliminate from the program at least one million children who would otherwise be eligible under the standards established by the states. This in itself may be conservative in view of earlier reports from some of the states. For example, California estimates that 25 percent of the eligibles or 175,000 would be eliminated under these regulations; Michigan estimates that 150,000 would be eliminated; and New Jersey estimates that 50 percent or 75,000 would be eliminated.

In conclusion, Mr. President, we urge you

to intervene in this situation immediately and to prevent what we must consider an unlawful interpretation of Public Law 91-248 which was passed by the Congress and signed by you as a fulfillment of our pledges to put an end to hunger in America's schoolrooms.

Sincerely,

PHILIP A. HART,
ALAN CRANSTON,
HARRISON A. WILLIAMS,
MARLOW W. COOK,
CLIFFORD P. CASE.

LIST OF SIGNERS

Clinton P. Anderson, Birch Bayh, Lloyd Bentsen, Alan Bible, Quentin N. Burdick, Robert C. Byrd, Howard W. Cannon, Lawton Chiles, Frank Church, Alan Cranston.

Thomas F. Eagleton, J. W. Fulbright, Mike Gravel, Fred Harris, Philip A. Hart, Vance Hartke, Ernest F. Hollings, Harold Hughes, Hubert H. Humphrey, Daniel Inouye.

Henry M. Jackson, Edward M. Kennedy, Warren G. Magnuson, George McGovern, Thomas J. McIntyre, Lee Metcalf, Walter Mondale, Joseph M. Montoya, Frank E. Moss, Edmund S. Muskie.

Gaylord Nelson, John O. Pastore, Claiborne Pell, William Proxmire, Jennings Randolph, Abraham Ribicoff, Wm. B. Spong, Jr., Adlai Stevenson, Stuart Symington, John V. Tunney.

Harrison A. Williams, Jr., Howard H. Baker, Jr., Glenn J. Beall, Jr., Henry Bellmon, J. Caleb Boggs, Edward Brooke, James L. Buckley, Clifford P. Case, Marlow W. Cook, Robert P. Griffin.

Mark O. Hatfield, Jacob A. Javits, Charles McC. Mathias, Jr., Bob Packwood, Charles Percy, Richard S. Schweiker, Hugh Scott, Ted Stevens, Robert Taft, Jr.

TRIBUTE TO SENATOR ELLENDER

Mr. FANNIN. Mr. President, I wish to add my voice to those who have paid tribute to Senator ELLENDER on the occasion of his 81st birthday.

As one who has been associated with agriculture for many years, I am most aware of the devotion of Senator ELLENDER to solve the problems of American farmers. He has worked both to secure a stable food and fiber supply for our Nation and to provide a better life for rural Americans.

We are fortunate to have had Senator ELLENDER as chairman of the Senate Agriculture Committee for so many years.

During his three and one-half decades in this body, the senior Senator from Louisiana has shown a rare combination of perseverance, patience, and courtesy. This is a most welcome opportunity to salute the very able chairman of the Appropriations Committee and President pro tempore of the Senate.

THE IMPORTANCE OF URBAN MASS TRANSIT

Mr. SYMINGTON. Mr. President, we are said to be a mobile nation; unfortunately, however, we are standing still, sometimes not so silently, as we sit in snarled traffic in the cities of America.

The automobile, once the ultimate in safety and convenience, if only as a means to get to work, has since in some ways become a burden to working men and women whose jobs are located at substantial distance from their homes. In addition, we know from our own experiences that parking has become a steadily more serious problem in crowded urban areas, not to mention the cost of parking if space is not available on the street.

The intercity traveler, slowed down when he reaches the urban fringes, finds congestion tends to worsen as he approaches the core of the city, especially during peak commuter travel periods.

Our highways and freeways have alleviated some of the intercity traffic problems; however, they have been proven ineffective and inadequate in moving the large volume of automobiles and buses that must move in and out, as well as within our urban areas.

Our highways and freeways have served us well in the past and most likely will continue to do so in the future, but highways and freeways alone are not enough to meet the transportation needs of urban America today.

It is my conviction that the most clear-cut transportation need in urban America lies in the area of mass and rapid transit systems for metropolitan areas.

We need to move ahead now on development and deployment of quick, efficient, reliable, and comfortable systems of getting from one place to another in our urban areas.

Mass and rapid transit is of concern to us all; for its development could very well produce results which, in terms of its impact on our urban society, would be both far reaching and favorable.

Urban dwellers, the American public in general, business as well as Government, would all benefit from improved transportation services.

For several years now, I have talked, both publicly and privately, with various individuals, groups, and organizations regarding the present and future needs of our transportation system. I have also advised officials of the transportation agencies of St. Louis and Kansas City of my concern for the priorities of their programs.

Present figures show that over 70 percent of the Nation's population lives in urban areas; and as our urban population continues to grow, the number of automobiles on our streets is likely to grow as well. It is estimated that by 1980, urban population will have doubled since 1960, and that urban car ownership, if there is no change in the direction of urban mass transit, will rise about 83 percent in urban areas.

Further evidence of the importance in developing an efficient and reliable mass transit system is the fact that traffic tieups in our metropolitan areas have cost billions of dollars through delays in the delivery of goods and the performance of services. We pay a burdensome price in terms of wasted human time—countless man- and woman-hours irrevocably lost every day because of snarled transit systems, hours which must be subtracted either from productivity on the job or, more often, from the individual's personal time on the job.

Less people use mass transit systems than was the case 20 years ago. Transit industry officials know that aging facilities are a factor causing passengers to abandon mass transit vehicles, and they also know that without adequate funds the status of transit services will likely remain the same.

Many transit systems are faced with the threat of bankruptcy. As an example, the Kansas City Area Transportation Authority, operating 350 buses in an area serving 1.5 million people, was recently on the edge of bankruptcy.

Bankruptcy was averted, however, when the Missouri Legislature approved a one-half percent sales tax proposal which, in effect, will provide Kansas City with an estimated $6 million in additional funds to help offset losses, lower fares, and improve services. This sales tax, I am told, is expected to place the Kansas City Area Transportation Authority on a sounder economic basis for present operations and future expansion.

Transportation officials have further advised me that it was first necessary for Kansas City to solve its financial problems before it could be considered for a rapid transit system; and now that progress has been made, Kansas City is regarded as an ideal site for a mass and rapid transit system between the downtown area and the Kansas City International Airport.

At this point, so as to indicate in what direction transportation officials are looking in order to reduce not only pollution and noise but also traffic congestion, it would be well to speak briefly on one projected form of rapid transit—the tracked air-cushion vehicle. Such a system is under consideration for Kansas City.

Some advanced versions of this vehicle will carry a capacity of 80 passengers at a time, at speeds of up to 150 miles per hour. In France today, two tracked air-cushion vehicles are operating—the 80-passenger vehicle near Orleans and a 44-passenger vehicle at Gometz-la-Ville near Paris. Thousands of people have ridden these two vehicles now operating in France, and the ride is invariably described as pleasant and impressive.

The tracked air-cushion vehicle appears to be best suited as an airport-access vehicle, as a means of relatively long distance commuting or as a transportation link between the suburb and the city.

The tracked air-cushion vehicle is guided along a track and supported over it by pressurized air cushions. Propulsion for this vehicle will, in most cases, be provided by an electric motor, commonly known as the linear-induction motor.

In that connection, environmentalists and transportation officials alike are focusing on the linear-induction motor as the most practical and most feasible propulsion system yet developed to meet the environmental test—low noise levels and pollution free.

A 120-miles-per-hour version of the tracked air-cushion vehicle being tested in France indicates, for example, that the noise generated at high speeds will not present any serious difficulty. Experts, both inside and outside the Department of Transportation, feel that a 150-mile-an-hour vehicle will not generate noise levels any higher than those associated with a limited-access highway: that is, the tire noise from a heavy truck proceeding at 60 to 70 miles per

hour. For this reason, noise is not expected to have an adverse effect.

It would appear evident, therefore, that if an antipollutant propulsion system, such as the LIM, was used in new modes of mass and rapid transit, it would serve as one solution in alleviating the adverse effects on the environment that present automobiles and buses have produced.

In an effort to upgrade its facilities and improve its services, transit companies in many of our metropolitan areas, such as Washington, D.C., have been experimenting with exclusive busways, which allows a bus to move freely from one designated location to another without the usual automobile traffic to contend with. Transportation authorities believe that this is proving to be an effective method of dealing with rush-hour, urban traffic congestion.

The declining status of present modes of transit to move people and the growing demands for faster and better all-around service make it imperative that we hasten our efforts to employ these and other innovative forms of mass and rapid transit.

DAVID SCULL

Mr. MATHIAS. Mr. President, in the 1960's, in nearby Montgomery County, Md., a commercial real estate developer named David Scull saw that new highways and housing had gobbled up farmlands and wiped out the jobs and homes of farm workers; that real estate values had soared, putting suitable housing out of reach of the poor.

Mr. Scull led the fight among his neighbors and citizens to bring about an awareness of the poverty which often exists, half-hidden, in the midst of an affluent community. As a private citizen and as a member of the Montgomery County Council, his leadership has left all of Montgomery County's half-million residents in his debt.

David Scull died of a heart attack in 1968 at the age of 51. His work is now being continued by others, but David Scull has now received national recognition in the pages of one of America's most widely read magazines, Reader's Digest.

Mr. President, I ask unanimous consent that the article, "The Legacy of David Scull," from the Digest, be printed in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

THE LEGACY OF DAVID SCULL

(By James E. Roper)

David Scull had a stunning message for his neighbors in Montgomery County, Md.—a wealthy suburb of Washington, D.C. "We have intolerable poverty here," Scull said. "Yes, poverty."

Scull was disturbed. Most of his neighbors, preoccupied with commuting to their upper-income jobs in government and business, hadn't noticed the poverty, even when it existed in the vicinity of their $50,000-and-up homes. But Scull, as a developer of commercial real estate, saw it every day. He also saw that highways and luxury housing had gobbled up farmlands wiping out jobs and homes of farm workers; the real-estate values had soared, putting suitable housing out of reach of these poor people. At least 1000 families had fled to scattered abodes unfit for human use—shanties without water or electricity, barns, garages, even packing crates.

At first, Scull asked the federal government for a low-rent housing project. But U.S. officials insisted the county government would have to propose such a project, and the county wasn't interested. Frustrated, Scull summoned his neighbors. "It's up to us to fight this poverty," he said. "And let's not just talk. Let's do it."

In October 1965, without fully realizing what they were starting, Scull and his friends, supported by Christ Congregational called Emergency Homes, Inc. (EHI). They chipped in money to rent and refurnish a house for the family of a 67-year-old man whose home had been razed for new construction. They supplied the down payment on a five-bedroom house for a family of 14 who had been living in a shack.

Not surprisingly, pleas for housing were soon coming in from scores of families—including a group of six living in a junked automobile, a 90-year-old man and his son in a six-by-eight-foot shack, and a cancer victim supporting 13 children. Scull's enthusiasm and vitality were infectious. He worked weekends and evenings hunting for vacant properties, then persuading the owners to rent to EHI. Most of the houses were in such bad shape that Scull had to round up volunteer painters, plumbers and carpenters to make them livable.

In little more than a year, Scull put 17 families into new homes. EHI paid the full rent, then sublet to the poor—usually for about one-fourth the family's income. EHI, with the help of contributions from 18 Protestant and Catholic Churches, made up the difference. It also provided volunteer social workers to visit each family weekly. The hope was that the families would become stable enough to reach self-sufficiency in a year or two.

It didn't work out that way. A few EHI families did "graduate" to paying all their rent, but many others fell behind. Families quarreled, husbands drank, gambled, lost their jobs. Some 18 months after the program began, at least half the families were failing, and the EHI treasury had melted to $27.

But Scull persisted. "We have learned that poverty is a total condition," he told EHI backers, "not just lack of housing. We must find *all* the problems and solve them."

Increasing his own commitment, Scull won election to the Montgomery County Council. There, he fought successfully for a county housing authority and other measures to help the poor, continuing to tend his EHI tenants at the same time. Finally, under the pressure of work, Scull gave up the presidency of EHI in favor of one of his earliest volunteers, F. Lisle Widman, an international financial expert with the U.S. Treasury Department.

At about the same time, EHI toughened its rules: families receiving EHI housing would be required to accept financial and homemaking counseling. To provide this help, EHI recruited volunteers from the county's rich pool of talent, including a White House budget officer, a credit-union manager, lawyers, engineers, skilled workers and housewives. Nearly all took special training from the University of Maryland.

The plan was to have a counseling team—a man and a woman—spend one evening a week with each EHI family. It was an exercise that soon paid off. The counselors discovered that some of the family failures stemmed from an appalling lack of knowledge. For instance, one woman was paying $4 a month for insurance against loss of income, even though her only income for years had been from welfare. Another woman, an illiterate whose eldest child was five years old, had been sold an encyclopedia.

Week after week, with tenderness and tolerance, the home counselors showed the poor how to cope with these problems. Getting eyeglasses for one youngster changed him from a truant into an honor pupil. Counseling showed a church janitor, who had been living for 11 years in a 7-by-11-foot lean-to, how to save so much money that now he is buying a house, even without a rise in income. Financial counselors spent days leading the poor through bureaucratic labyrinths to get tax refunds or establish their claims to Social Security.

Counselors were also ingenious in boosting family incomes. A woman with nine children and no husband looked like a locked-in welfare case until a counselor got her a job in the cafeteria of the school which most of her children attend. A truck driver who worked for one company for years for only $2 an hour, mostly out of loyalty, was persuaded to take another job at $3.25 an hour and to work for his old company on his days off; now he's off EHI subsidy.

The counseling was so successful that two thirds of EHI families reached the road toward self-sufficiency. Even families that did not need housing began to ask for counseling. Today Mrs. Eleanor Widman supervises classes, open to anyone, in adult education, sewing, hygiene and child psychology, with considerable side talk about birth control. Volunteers drive the students to classes, provide lunch and operate nurseries while mothers study. After one class recently, a woman told how EHI had moved her family out of a rundown apartment into a three-bedroom house, got her husband a job and taught her how to manage her six children, make her own dresses and save food dollars.

Unfortunately, David Scull did not live to see the fruits of his endeavors. He suffered a heart attack and died in 1968, at the age of 51. Today, three years after his death, his legacy includes the happiness of a lot of people, a Montgomery County public-housing project that bears his name, and, of course, EHI itself, now with 300 volunteer workers. But Mrs. Scull says her greatest legacy is the volunteers' firsthand knowledge of poverty and how to cope with it. They have used that knowledge, she says, to influence the county government toward compassionate and practical programs for the poor. Which is what Dave Scull wanted all along.

ANTITRUST LAWS AND PROFESSIONAL SPORTS—ARTICLE BY BRUCE DRUCKER

Mr. SPONG. Mr. President, the September–October 1971 issue of Case & Comment contains a timely review of "The Antitrust Laws and Professional Sports," written by Bruce Drucker, an attorney practicing in Denver, Colo. I ask unanimous consent that Mr. Drucker's article be printed in the RECORD.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

THE ANTITRUST LAWS AND PROFESSIONAL SPORTS

(By Bruce Drucker)

The sports pages these days look more like advance sheets. Professional sports have been hit with a series of lawsuits which threaten their present structure if not their existence, on antitrust grounds.

As even the greenest businessman knows, federal antitrust laws prevent competitors from doing many things which, while admittedly profitable, would inhibit competition and therefore the nation's economic health. The Sherman and Clayton Acts outlaw price fixing, boycotting, mergers resulting in monopoly power, and collusive bidding. These rules apply to most but not all industries. Among those excluded, at least for the present, is baseball.

THE BASEBALL EXEMPTION

What antitrust lawyers consider the "baseball exemption" was born fifty years ago of hasty precedent, and has been nurtured to middle-age today on the common law respect for history and Congressional silence. In 1922, the Federal Baseball League brought to the United States Supreme Court its complaint that the established National and American Leagues had conspired to destroy it. Oliver Wendell Holmes, usually an adept fielder of difficult issues, lost this one in the sun. Federal antitrust laws regulate interstate commerce, but, said Mr. Justice Holmes, "the business (of baseball) is giving exhibitions of baseball, which are purely state affairs."[1]

The decision is an odd and problematic one. Does it mean that baseball is not interstate, or not commerce? Neither reading seems correct to modern courts. Given a second chance to find the rationale for this exemption, the Supreme Court in 1953 interpreted that Holmes' opinion as determining that the courts should not upset the game's intricate commercial mechanism, which had developed over the years without Congressional guidance.[2]

Under today's broader definition of the terms, baseball would doubtless be considered both "interstate" and "trade or commerce," and as a result subject to the antitrust laws. Many courts have acknowledged this[3] but are bound by the high court's refusal to re-examine *Federal Baseball*. Stasis is also reassured by years of Congressional inaction. And as the years pass, lawyers advocating the exemption can point to that inaction as further evidence of original Congressional intent—a neat bit of sophistry not unlike the double steal.

THE RESERVE CLAUSE

The Supreme Court may yet have another opportunity to reconsider. Last spring Curt Flood sued baseball commissioner Bowie Kuhn and both major leagues, attacking the "reserve clause" on antitrust grounds. Flood had been traded by the St. Louis Cardinals to the Philadelphia Phillies at the end of the 1969 season. He refused to play with the Phillies, sat out the 1970 season, and was then traded again to the Washington Senators.

Flood lost his case at trial, his bat on his shoulder, while the judge threw *Federal* Baseball past him.[4] The Second Circuit has affirmed,[5] and Flood's lawyers, led by Arthur Goldbey, have announced their intention to seek Supreme Court review.

The reserve clause which Flood has attacked is not one clause at all but a network of provisions in both the Uniform Players' Contract and the Professional Baseball Rules. First, by league rule, every club-player contract must contain a reserve clause.[6] The Uniform Contract provides that, if a player and his club do not reach agreement on a new contract in the year that the old contract expires, the club may renew the existing contract, with certain salary controls, without the player's consent. The renewed contract itself also contains the renewal clause. In this manner, the club with which a ball player first signs can perpetuate his services as long as it wishes to renew his contract. The player's only right is to retire from baseball.

The Uniform Contract then provides that a contract can be assigned without the player's approval to any other major league team. If a player retires, fails to report, or fails to enter a contract with his club, he is by the rules placed on a reserve list. The rules further prohibit any player on a reserve list to play for or negotiate with any other club until his contract has been assigned or he has been released. Finally, the rules forbid any club negotiating or tampering with players for another club.

Complex, anticompetitive, and perhaps necessary to the very existence of baseball. Or so, in the *Flood* case, testified Jackie Robinson, Hank Greenberg and Bill Veeck. On balance some continuity of teams, some club-player control, and some uniformity among clubs within the league is essential for professional baseball as we now know it to survive. The same would seem true of professional football, hockey and basketball.

So it would seem. But the baseball exemption disappears, like the bleacher rat, with the last out of the season. Recognizing that the logic of *Federal Baseball* was less than firm, the courts have refused to exclude any other sports: baseball alone is exempt from the laws. (One judge recently tried to justify this unique status on the grounds that baseball was not business but a national pastime).[7]

OTHER SPORTS

All other professional sports are regulated by the same laws as govern, say, road builders. The Supreme Court has held that former Detroit Lion guard Bill Radovich could sue the NFL for an alleged conspiracy to break up the All-America Conference. In doing so, it refused to overrule the baseball exemption, yet called the distinction between sports "unrealistic, inconsistent . . . illogical."[8]

Football, boxing, and hockey must therefore obey the antitrust laws. Whether or not football does so is a question now being asked by a Cleveland grand jury.

Reportedly sparked by ex-Brown Walter Beach, the grand jury began calling coaches, owners and players last November. Its inquiry has ranged from coaching practices to waiver and trading procedures. And, if the reports of some of those who have testified are accurate, it should be getting an earful.

Jim Ninowski's threatened suit, for example. Second-string quarterback for the Browns in the early sixties, Ninowski supposedly received inquiries from the AFL before the merger of the two leagues. Some speculate that the threat of his "bolting" and escalating a war between the leagues hastened that merger. In 1966 by act of Congress,[9] the merger was exempted from that law which ordinarily prohibits the union of two leading competitors in any industry. The Congressmen apparently were thinking less about monopolies than Sunday afternoons. And Ninowski was left with only one market place in which to vend his wares.

But two other antitrust questions survived the merger. Dave Parks was San Francisco's first draft choice in 1964, and as the Forty-Niners' tight end made all-pro twice. In 1968 he played out his option—that is, he refused to renew his contract with the Forty-Niners and chose to look for work elsewhere. When he signed with the New Orleans Saints, NFL Commissioner Pete Rozelle, exercising an autonomy that was thought to have disappeared with the Romanoffs, penalized the Saints. He ordered New Orleans to give San Francisco its first draft choice for two years running.[10]

While football fans accept this extraordinary power in a commissioner, it contradicts what this country has historically protected as a basic economic freedom—the right to work for whomever one chooses. Former Viking chieftain Joe Kapp thought he enjoyed this same freedom. Having satisfied his contractual obligations, he could not get together with Minnesota on new terms. But as the quarterback who had engineered a Super Bowl victory the year before, he thought he might be able to get a job playing football for someone else.

He was close to wrong. According to ex-cornerback Johnny Sample, team owners had agreed to boycott Kapp; until he threatened suit they did not permit anyone to deal with him. As it was, Sample reports, the owners allowed only Boston to negotiate with Kapp.[11]

Sample himself has complained both in the grand jury room and out that his outspoken manner got him blacklisted from pro football. But Saints' owner John Mecom suggests that what a player may see as conspiracy is simply the consistent view of coaches that his playing days are over.[12]

FOOTBALL PRACTICES

Pro football has other practices which could stand scrutiny. Among them:

1. The draft—an agreed division of the working force, foreclosing the player from selling his services to all but one employer.

2. The owners' reaction to labor organizing, possibly typified by John Mackey's benching after he had led the short-lived and ineffective players' strike.

3. The refusal of at least one club to deal with any players accompanied at negotiations by a lawyer or agent.

4. The extraordinary power of the commissioner of the league—really nothing more than a trade association—to control the outside investments of an employee of a member club.

Practices in other sports are no more savory. Hockey's system of juvenile indenture and boxing's method of booking preliminary fights indicate that competition in those businesses may not be free and open. And the plight of Spencer Haywood, who has all but forsaken Chamberlain's court for Daumier's, indicates that pro basketball may have some problems too.[13]

None of this is to suggest that the laws necessarily should inhibit the operations of professional sports. Owners and league officials have not yet had their say. When they do, they will point out that their businesses differ competitively from conventional industries in several ways.

First, they draw from a labor force of small quantity and short tenure. Second, they depend upon fans' loyalty for profit—a loyalty which unlike "brand" loyalty would be destroyed were players negotiating mid-season or hopping from job to job. Most significantly, each club must have cooperation from its competitors—the other clubs in the league—to play through a season.

CONCLUSION

To date, little judicial and no legislative thought has been given to regulating these sports as industries. As a result, there exists an "inconsistent" and "illogical" distinction between baseball and other sports. In those other sports a climate of insecurity clouds the rights and obligations of both players and owners towards each other.

The Supreme Court may accept the chance to review the need for the baseball exemption. It is more likely that action by the Cleveland grand jury, which reconvenes next month, will foment the necessary consideration of the business of sports to produce orderly guidelines.

FOOTNOTES

[1] *Federal Baseball Club v. National League*, 259 U.S. 200 (1922).

[2] *Toolson v. New York Yankees, Inc.*, 346 U.S. 356 (1953).

[3] See *e.g.*, Friendly, J., in *Salerno v. American League of Professional Baseball Clubs*, 1970 Trade Cases para. 73,276 (2nd Cir. 1970).

[4] *Flood v. Kuhn*, 316 F. Supp. 295 (S.D.N.Y. 1970).

[5] *Flood v. Kuhn*, — F.2d — (2nd Cir. 1971).

[6] See description of the Uniform Players' Contract in *Flood v. Kuhn*, 316 F. Supp. 295 (S.D.N.Y. 1970). The very concept of a uniform contract may have antitrust consequences.

[7] See the opinion of Cooper, J., on Curt Flood's request for a preliminary injunction. 1970 Trade Cases para. 73,101 (S.D.N.Y. 1970).

[8] *Radovich v. National Football League*, 352 U.S. 445 (1957).

[9] Public Law 89-800 (November 8, 1966).

[10] *Cleveland Plain Dealer*, January 14, 1971 at p. E-1.

[11] *Cleveland Plain Dealer*, December 15, 1970, p. D-1.

[12] *Cleveland Plain Dealer*, January 15, 1971, p. C–1.

[13] Indeed the NBA's agreement among teams not to sign college basketball players until they graduate, has already been voided. See Ferguson, J., *Haywood v. National Basketball Association*, — F. Supp. — (D.Cal. 1971).

NATIONAL DRUG ABUSE PREVENTION WEEK

Mr. HRUSKA. Mr. President, it was highly gratifying to note that President Nixon again this year proclaimed "National Drug Abuse Prevention Week." On September 17 the President designated the second annual observance of this occasion to take place last week.

In his proclamation, President Nixon observed that—

> Drug abuse is nothing less than a life and death matter for countless Americans, and for the moral fiber of this Nation.

These eloquent words explain the need for special attention last week to a problem which must continue to attract our best efforts every week. I believe we have now gone beyond the point where we need to recognize this national threat for what it is. Many are already heeding the President's call to action; many more must now join if we are to make substantial progress in fighting this epidemic.

There have been some significant steps taken since the last National Drug Abuse Prevention Week. Principal among these has been the enactment of Public Law 91–513, the Drug Abuse Prevention and Control Act of 1970. This comprehensive law has already been responsible for increased and improved law enforcement efforts against the purveyors who make their living peddling dangerous drugs. This Senator, who is proud to have been a sponsor of this legislation, believes that this law represents the most affirmative step the Congress has ever taken to deal with a problem of this magnitude.

More recently, we have the creation by the President of the Special Action Office for Drug Abuse Prevention in the White House, with the authority to coordinate and oversee the various education, rehabilitation, and treatment programs at the Federal level.

In recognition of the special problem faced by the military, the Defense Department has initiated intensive education and treatment programs, which include the provision of amnesty to those who voluntarily seek treatment for their addiction.

New accords have been reached with concerned foreign nations like Turkey, France, and Mexico, who have pledged greater cooperation as a part of a growing international effort to eliminate this scourge.

More money, time and energy are now being devoted to the drug abuse problem than ever before. Still more efforts are in the planning stage. Regrettably, new addicts still join the ranks of those already hooked on drugs. Still others continue to experiment with these dangerous substances in ways that threaten their futures and their very lives. The enormous complexity and pervasiveness of this problem is made clear by the fact that we can see no immediate relief in spite of these fine efforts against it.

Drug abuse prevention is, of course, the key long range solution. While we fight this problem on all fronts, a reduction in the demand for drugs is the only way to fully eliminate the supply. No matter how effective our enforcement efforts—and they are more effective each day—there are those who will still find ways to make these drugs available. And when you are dealing with products which themselves create their own demand the difficulty is magnified.

Mr. President, I am hopeful that many citizens of this country resolved to use last week as a starting point for their own continued efforts to help. There are many children to be educated on the real dangers of drug abuse. There are many myths to be done away with. And there are many sick people to be given a helping hand, not condemned to a continuing life of addiction and crime.

National Drug Abuse Prevention Week is an occasion uniquely applicable to us all. For those of us fortunate enough to have avoided personal contact with this problem, the surest way to continue this good fortune is to become involved. If every American is willing to invest some time and energy, and to make last week just a beginning, the dividends produced will be a lasting boon to our children and to theirs.

THE PRICE OF A HEALTHY ENVIRONMENT

Mr. HART. Mr. President, we hear increasing comment these days about the "backlash" against the environment quality movement. One particular phase of this, and probably the most mindless and insidious, is the use of "environmental blackmail." The typical pattern of environmental blackmail occurs when a community is asked to make a choice between a proposed environmental cleanup effort and the economic prosperity provided by a plant which is the source of the pollution problem.

There have been a number of blatant cases of this kind of antienvironment tactic in recent months, including the threat of Union Carbide to lay off over 600 workers at one of their plants if they were forced to comply with tough air pollution control standards proposed by William D. Ruckelshaus, Administrator of the Environmental Protection Agency.

As we progress on the environmental front, of course there will be instances in which plant closings are in fact economically justified. Yet when they are not, the public at large will not be fooled by empty threats. The public made up its mind, in the period during and since Earth Day, to see to it that we regain a clean and healthy environment in all parts of our country, our rural areas and our cities. Most of our constituents have made up their mind, too, that they would support strong measures to accomplish this and that they would pay the price, in increased taxes and increased prices, where it was clear that this was the price required to put our economic system into step with environmental realities.

Numerous nay-sayers, of a predictable sort, had hoped aloud that the public commitment which was represented in Earth Day was only a passing fad, a temporary public enthusiasm, all sound and fury, but no depth. That was, no doubt, a comforting hope for those individuals for a time, but it is now abundantly clear that it just is not so. We have today the same high level of public commitment, revealed in all manner of ways. And we have a snowballing development of environmental interest groups at the grassroots in every village, hamlet, and urban neighborhood. These leaders have settled in for the long struggle, and they have the general public with them.

As evidence for what I have just said, I was interested to note recently that constituents of Congressman GERALD R. FORD in Michigan's Fifth Congressional District, which includes Grand Rapids principally, were recently asked in his congressional questionnaire: "Should the Federal Government expand efforts to control air and water pollution, even if this costs you more in taxes and prices?" To that question, on the basis of nearly 16,000 responses, 68 percent of these citizens said "yes," they would be willing to pay the price for a restored environment. Only 27 percent said they would not, with about 4 percent giving other responses. That is no isolated finding; it rings true with numerous other surveys, and with the continuing flow of support we in Congress hear from our constituents.

As another example, I would urge any skeptics to attend any public hearing held across this country on decisions involving environmental concerns—pollution standards, enforcement conferences, highway location and design hearings, and the like. You will come away with a vivid image of public involvement and dedication to environmental quality.

It is my prediction, Mr. President, that the environmental blackmail tactic is not going to work. Nor will the tactic of "divide and conquer" by which polluters and their apologists are trying to turn the public against environmentalism and environmentalists, painting these people as hopeless romantics or neoluddites who oppose progress mindlessly. And it is also my prediction that those who attempt this blackmail strategy will have simply called down greater attention on themselves and the pollution they are attempting to cover up and protect. Action to hold those individuals and organizations accountable will have my fullest active support.

Mr. President, these thoughts came to mind as I read an excellent statement on this problem which has been distributed by a citizen environmental coalition in the northern lake States region, the northern environmental council headquartered in Duluth, Minn. I ask unanimous consent that this statement, which appeared in this group's summer 1971 bulletin, be included in the RECORD at this point.

There being no objection, the statement was ordered to be printed in the RECORD, as follows:

WHERE WE STAND

The inevitable backlash against the environmental movement looms up on the smoggy horizon. It is unfortunate that those who benefit from free use of air, water and

land for disposal of untreated wastes seek to polarize the public with such slogans as "payrolls or picnics." Threatening plant closure is not true "industrial statesmanship"—Nader calls it "blackmail." Nor does the selection of a few instances of overstatement or error by environmentalists wish away the very critical situation we have brought upon ourselves.

It is not enough to say "bunk" to these charges—although most are! Man can, and must, learn to live on this earth in harmony with nature's systems, without further degradation. He can do so by encouraging clean economic progress which preserves the quality of life while producing the basic material goods to sustain life—all without taxing the eco-system's carrying capacity. The Northern Environmental Council firmly believes that this goal can be achieved in this region, and in the nation, through strict adherence to these basic guides:

(1) Air and water pollution devices can be installed in most industrial and electric power plants at a cost of 5% or less of the total capital investment.

(2) Pollutants and solid wastes should be recovered and converted by recycling into useable resources, thus *preventing pollution at its source,* while conserving the earth's natural resources.

(3) Highways, pipe and transmission lines can be fitted into already developed corridors (without slashing out new lanes).

(4) New planning concepts can be applied to urban and rural developments while preserving open green spaces and clean water.

(5) Land use planning must be widely adopted and implemented by strictly enforced zoning ordinances.

The Northern Environmental Council is urging these principles as a guide for economic change, and will insist on them as alternatives to single purpose projects destructively damaging to the environment. Our goal is to harmonize man's material needs with our natural life support system—and we intend to reach this goal. The alternative—continued mindless industrial and urban development—is totally unacceptable.

PLIGHT OF SERVICE CONTRACT WORKERS

Mr. MATHIAS. Mr. President, the distinguished Senator from Florida (Mr. GURNEY) testified on October 12 before the Special Labor Subcommittee in the House in regard to the Service Contract Act of 1965.

I believe that Senator GURNEY's comments relative to the plight of service contract workers merit the attention of all Senators who share an interest in this serious problem, I ask unanmious consent that Senator GURNEY's comments and the ensuing discussion be printed in the RECORD.

There being no objection, the items were ordered to be printed in the RECORD, as follows:

STATEMENT OF THE HONORABLE EDWARD J. GURNEY, U.S. SENATOR FROM THE STATE OF FLORIDA

Mr. GURNEY. Mr. Chairman and members of the committee, it certainly is nice to be here this morning. I think this is the first time I have been in the hearing room before this committee since I sat as a part of it. I also considered it one of the most effective committees of the Congress even though sometimes I didn't agree with all of the things that we turned out. Anyway, it is a pleasure to be with you.

Mr. Chairman and members of the committee, I appreciate the opportunity to appear before you today in order to relate my views with regard to the Service Contract Act of 1965.

As you will notice, I represented the Cape Kennedy area as a Congressman and it is now part of my constituency as a senator. Last year we had a re-bidding of a NASA Service Contract. The only material thing bid was wages and able, loyal workers found themselves earning, a day after the contract was awarded, one-quarter, one-third, even as high as 50 percent less than before, doing precisely the same job as the day before.

Now we have another Service Contract out for bid at Patrick Air Force Base. This is the Service Contract now held by the Pan American and RCA people and exactly the same thing will happen in this case. Only wages will be bid and the worker's pay and his ability to feed and clothe and house his family is now out on the auction block. I firmly believe that an average wage should be determined by the Labor Department after a thorough wage study today in these Service Contract cases, a wage below which a bidder may not go, and I have requested the Labor Department to do this.

In fact, I have requested it twice. The request was denied the first time and I have not heard from the second request as yet. I certainly hope that your committee will help in drafting legislation to accomplish this goal in this Service Contract area.

Mr. THOMPSON. I would hope, Senator, that that not be necessary, although it appears that it will be, the laws in existence, the capability is there, and if they would do, as you and your distinguished colleagues have suggested, and as we think, I think, they should do, this matter could be straightened out real quickly without amendment to the law.

Mr. GURNEY. That is true, Mr. Chairman, and later on I will point out in my testimony that, in a very similar case, that is precisely what they have done.

My understanding on the basis of the report made by the committee that the plight of service workers under contract that the committee is well-aware of a cloud of professional and economic uncertainty that hovers over the heads of over one million service contract workers fulfilling 25,000 service contracts.

In March, April and May this committee heard witness after witness present wage and job statistics and the committee also had a witness' description of bidding and contract conflicts and received testimony documenting the Labor Department's failure to conduct meaningful wage determination studies.

I commend you for these hearings. I think you have performed a fine service and I would also echo your views, that is, I wish the Labor Department would be a little more responsive.

Now, I notice that you received a lot of testimony on the specifics, particularly with regard to Florida and the Cape area and I don't intend to go over those. I would rather address myself to the question of the government's relationship with its citizens in this part of the statement and, in particular, the crises of the men and women involved in the nation's space program.

In 1957, when the Russians launched the first satellite, Sputnik, our nation was shocked and this shock gave way to the determination by the United States of America to become leader in space technology and we announced our challenge which became known around the world as "race to the moon".

The government asked industry and educational institutions and especially workers of America to respond by dedicating themselves to this goal. I don't need to describe, of course, what took place over the next ten years. We all had opportunity to review those results ourselves on our television sets, but we witnessed only the culmination of this effort. Our visual sharing represented, of course, the tip of the iceberg only. Beneath that tip were hundreds of thousands of man-hours dedicated to making this nation first in space technology.

Man's greatest adventure has awarded its society with hundreds of spin-off benefits and we enjoyed tremendous breakthroughs in the field of medicine and unique benefits in dozens of unrelated industries. Now we see some architects and builders and especially workers that provided all of these things being rewarded with unresponsiveness in time of their great need and our current mistreatment of thousands and thousands of technicians and laborers reminds me of the tale of the village that wanted to cross the sea. The villagers looked around the land and there were few oarsmen courageous enough to man the vessels but finally some men agreed to try and the village began their voyage.

The oarsmen endured rough seas and the heat of the sun and perils of the storms and thirst and hunger and regardless of the obstacles they kept rowing and finally the vessel crossed the sea and arrived at the new land entering the harbor, the villagers became fearful there wouldn't be enough for all in the new land, so they threw the oarsmen out of the boat and into the sea and today I think at the Kennedy Space Center we are witnessing the oarsmen of our space program being cast into the sea, too, a sea of highly trained and middle-aged, unemployable families, a sea of broken retirement contracts and repossessed homes and personal and economic despair.

Unfortunately, in view of what appears to be the current attitude of the Department of Labor, this sea may well become deeper.

I think what we have before us is a moral question as well as a legal and technical question. This Congress must decide whether it is moral to trade men's wages and careers for the sake of expediency and this Congress must today decide if it is moral to turn our back on men and women who have given up more than half of their productive years in order to respond to a challenge their government issued. It is my sincere opinion that all of our branches of government must take immediate steps to see that our laws are regarded as relationships among men and not relationship-wise just other laws and these Service contracts are contracts with men, people, and not members and their contracts cannot be viewed only in terms of dollars. They must be viewed and analyzed in terms of the ultimate benefit to all of us.

Mr. Chairman, I ask your committee to give most serious consideration, not only to legal and technical aspects of these hearings that I know you heard abundant evidence on, but to this very moral question, the answer to which will affect lives of millions of workers and their respective families in their future contracts with good faith of this government.

On all counts, I think the evidence will be overwhelming that in the bid and award of Service Contracts, workers' wages should not be put up for auction to be sold to the lowest bidder. Let there be a wage study, a determination of reasonable average wages so that the worker will be protected and the government and nation will be better served.

I have a number of letters, Mr. Chairman, that I would like to put in the record. They show many facts.

Mr. THOMPSON. Without objection, any of those, Senator, that you want in the record will be entered at this point.

Mr. GURNEY. Thank you, Mr. Chairman, I won't go through all of them but they illustrate in the case of people receiving $5.00, $5.65 an hour in the first one and, after the Service Contract at NASA, it was $3.79 and then receiving $5.45 and after award, $3.45, and so on, which seems unconscionable for

doing precisely the same work before the new contract.

I would also like to thank Dean McCroskey, President of Local 673, the International Association of Machinists, who put some of this material together. I would also like to have included in the record a letter that I sent to Secretary Hodgson on October 1, requesting a wage study and this is the second request about Patrick Air Force Base.

Mr. THOMPSON. What was the date of your first request, do you remember, Senator?

Mr. GURNEY. No, I don't. It was earlier in the year, late this spring or early this summer, but I don't recall exactly. This was denied.

Mr. THOMPSON. Obviously, you anticipated this problem.

Mr. GURNEY. Yes, I was joined by the way in that with Senator Chiles and Congressman Frey.

Mr. THOMPSON. Yes. I might say your statement is, I think, a remarkably good one. I am particularly touched and I think that the people whom you are appearing on behalf of will certainly be grateful for your compassion and your understanding of the problem.

Your figure of speech of the oarsman, I think, is particularly touching and absolutely relevant. The refusal of the Secretary, once again, to make a wage determination, gives rise to this hearing and it is not unlike the Australian bushman with a new boomerang that spent three years trying to throw the old one away.

Mr. Dellenback?

Mr. DELLENBACK. That is a tough act to follow.

Thank you, Mr. Chairman.

Ed, we are glad to see you back.

Mr. GURNEY. I am glad to be back.

Mr. DELLENBACK. I do commend you again for what has been a very helpful statement. We do understand the difficulty of this problem because it is a tough one, it is a real tough one, because I notice you are one of those who has joined with other members of the Senate and House in feeling that there must be every type of feasible economy exercised in what the Federal government does in spending the tax dollars which come from the citizenry of Florida, or Oregon, or New Jersey, Michigan, or anywhere else and you have been long one who has spoken very eloquently about the need for fiscal economy and that is the type of bind we now find ourselves in because we have a program here which has a reduction in expenditures, which has been brought about, not by the Administration but by the Congress, and the Senate and House have ordered reductions in expenditures.

How do you do that without causing some dislocations? The question is, "How to make those dislocations as equable and reasonably applied as possible."

Somebody is going to lose a job and somebody is not going to sell his goods somewhere and somebody may end up getting less money somewhere. How do you balance it off?

That is what you spoke very eloquently on behalf of your constituency, feeling in this instance that is not where this particular bite should come. I don't know where it should come. That is not our function, but the function of Congress, as we know, is to try to set up fair operating procedures to establish the ground rules and look for equity in those ground rules so that the Administration, whatever its political label may be, can do the best possible job.

While I am not satisfied with that which the Department of Labor has here done, I certainly sympathize with them, also, in the difficult task that faces them. What do they do in this situation?

May I ask you one question on the specifics along the lines of what I had been looking for earlier? Do you have any specifics about comparability in employment outside of this particular government installation and whether or not the wages being paid outside are, in fact, higher or lower, or substantially equivalent to those being paid in the installations?

Mr. GURNEY. Yes, I do. I had a wage study made on my own since the Department of Labor wouldn't do it and I have a copy of it here and I would be very glad to furnish it to the committee.

Mr. DELLENBACK. Mr. Chairman, I would think that would also be helpful to us.

Mr. THOMPSON. It is good to have some information from somewhere.

Mr. GURNEY. The important table is in the rear end of it, the very last page of the study, known as Exhibit 4. This involves electronic technicians. This was a study of one of the major job classifications at RCA and Pan American and comparing their wages with other companies in the area.

It does not cover all of the workers under their contract but it covers the largest job classification. You will see that the wages, and let me see, there are five companies outside of the two that are involved in the Service Contract and some of these companies are employed by the government and some in private industry in Brevard County.

The wages, minimum and maximum, of the companies involved in the Service Contract are down at the bottom of the study, $3.03 minimum in both cases and $4.21 being the maximum for this job classification. And the wages of the other five companies range from $5.04 to $4.59 on the minimum side to $5.21 to $4.35 on the maximum side.

This is just exactly the point I was making to the Secretary of Labor, that even right now under the Service Contract we have, the wages down there which are being paid under this Service Contract are among some of the lowest in the area. If we put this contract out for bid and bid this down, I cannot see how that can do anybody any good, but it can do all kinds of workers a great injustice.

The other thing that really provokes me about the whole matter is, there is a similar contract at Vandenburg Air Force Base right today out for bids and it is just like the one down at Patrick Air Force Base. I say it is like this one. It is a Service Contract.

I won't represent to the committee that every job classification was the same, but it is very strange to me that the Labor Department made a wage study and a wage determination at Vandenburg in California. They have already done it and it came in a few days ago, but for some reason they won't do it in our neck of the woods.

If it applies in one area to a space program on an Air Force Base, to a Service Contract, I don't know why it wouldn't apply in Brevard County, Florida.

So I would like to say this, incidentally, the wage study made by the Department of Labor at Vandenburg is in this study of mine too, and I hope the Secretary will open up his ears and listen more attentively this time and especially if this committee puts heat on him, he might, because it is not fair to do it in one place and not another. The point of the matter is, I agree with you, Congressman Dellenback, this is an area where we need to do economy.

I know, and you know as well as I, that I am one of the most economic minded people in the world, but simply because I don't like some new programs that generates large new spending, I don't think that has anything to do with cutting wages of people who have worked for years and years on a job and are doing good work. I don't think in the Service Contracts we should put wages out for bid because there is no reason in God's green earth why we can't do a wage study and come up with a reasonably average wage in an area serviced by a government contract and say: "When this thing goes out for bid, you can't bid below this."

It seems to me it protects the government and the workers and does a fair, equal thing for everybody concerned. This is the point I make.

Mr. THOMPSON. The fact is, as Mr. Dellenback points out, there have been cutbacks notwithstanding, however, that there has not been a cutback with respect to this $78 million contract. We have made a commitment to it and it exists—if fewer service contract workers are needed, I feel sorry for those who have to go, but, on the other hand, as long as we are continuing this $78 million commitment, the point that you make, that it shouldn't be done on the basis of bidding for wages only, that that is totally and absolutely unfair.

I don't know the complete picture of the wage structure in Brevard County. I would think in certain areas of it that the wages would be relatively low in certain occupations, but in these occupations, a majority of which are skilled, I was frankly startled to learn of the disparity between the private sector and the public sector in the terms of wages and your statistics are going to be extremely valuable to us.

The Secretary in his letter to me of September 13 goes back to 1967 and says that he, in effect, does not have the people to make a wage determination. He can do it at Vandenburg or elsewhere, but not in Florida. But then he goes on to say that the Department decided in 1967, with no people, no people with whom to make or send down there, decided in 1967 that the pattern of wages in Brevard County was such that the limited resources available—Well, available for making a determination could more appropriately be used for making it in other localities. Wages paid to service workers in the county continue to be equal to those paid to other workers in the community.

How he can arrive at that decision after saying he has not studied it is beyond me.

When Mr. Silverman appears on Thursday we will discuss it with him. It is not my desire, by any means, to have an argument with Secretary Hodgson, whom I respect and who I think is a splendid man, but I simply want him to administer the law as it was intended when it was passed and it is rather tragic that if the pattern of these hearings continues to be that he will refuse to make those determinations and also to refuse to blacklist as he is supposed to do under the law, the terrible violators of the law who take advantage of these poor people every where. Then it is tragic that we will have to legislate more strike controls. I would much prefer, of course, not to do that. The fact is, Senator, as you know, that these service contracts exist throughout the whole United States and this persists throughout the whole United States. It should not. In some cases they have made determinations, in the case of some truck drivers on one of the bases they were getting something like $1.45 an hour, or $2.45 an hour, and for comparability, of all things, the Department of Labor said: "Well, let me see, you are the only drivers in the area and you make $1.45, therefore, the comparable wage is $1.45."

They did the same thing in the case of plant guards at another place. That does not make any sense because there might not be guards elsewhere than in a military establishment in some areas. Certainly there probably were not any in Brevard County before the build-up of the tremendous space program.

Mr. DELLENBACK. I would assume you don't suggest in the enclave situation that is not exactly what they might have to do so in some instances that is the only comparable way and it might well be that is the only way to get a figure?

Mr. THOMPSON. Yes, it might well be we have to stick to the enclave theory in this case because of the highly specialized types of work, and, as Mr. Evans said, the exotic job descriptions do not exist anywhere else,

not just at Kennedy or in Florida or Brevard County but elsewhere.

Mr. DELLENBACK. Again, the only thing I would emphasize—and I do this only out of fairness—it does not seem to me, at least as I see it, that under Section 4(b) the Secretary has not performed his legal obligation. What is being said by the Senator from Florida now testifying and what has been said by earlier witnesses is that they feel that this should not be one of the places where he exercises this discretion given him not to make the study.

I don't think he has not done what authority tells him to do but it is a legal question if this is not one of the cases that he should go ahead even though he has the authority not to go ahead.

I feel you are saying, Senator Gurney, that they might be acting properly but this is not what you ought to do but you ought to go the other way under what is also permissible to you.

Mr. THOMPSON. If the gentleman will yield—and I don't mean to be unfair to the Secretary, but in the case of one service contractor, Dynamic Enterprises, it was found in violation of the law in 18 separate locations, moving from here to there and the other place throughout the country. The Secretary refused to blacklist him, notwithstanding that persistent and unconscionable pattern of violation.

Mr. DELLENBACK. That is not the case I alluded to but I am talking about the case before us and looking at the language of Section 4(b), and I see there is authority for him to do it.

Mr. THOMPSON. He has discretion.

Mr. DELLENBACK. We may find fault with his judgment, but we cannot, in good conscience, say, "You have failed to do what the law mandates you to do." We are saying we don't think this is the place, or I read the chairman or the witness as saying something other than that.

Mr. THOMPSON. Yes. What we really say is this: "You have this discretion. We don't agree."

Mr. DELLENBACK. "So you act improperly."

Mr. THOMPSON. Right. So I say I would much prefer he change his mind and make this determination than to take Section 4(b) and amend it and tighten it up in such a way as to say he has no discretion.

Mr. DELLENBACK. I assume when the gentleman from Michigan, for whom I have tremendous respect, drafted this law, there was a reason for thinking there might be special cases where there ought not to be a mandate. As you just said, Mr. Chairman, our problem is to keep flexibility in the law so we don't make mandatory something that would be wasteful and counterproductive and yet be sure that that discretion is fairly carried out.

May I just ask one more question of the Senator and then I am finished on this. Do I assume, Senator Gurney, the report you have given to us covers the time and who it was that made the study and the basis of the study and all of this?

Senator GURNEY. It was covered very recently. I got one of my friends to do this, and I would rather not disclose who did it, but I can vouch for accuracy of the figures in there.

Mr. DELLENBACK. I think it is important, if we are going to use the figures as we were in questioning of the Secretary or Under Secretary, that we have some base upon which to do so, being able to tell them how many people were interviewed and when it was done so that we are sure of the statistical soundness of the data. This is excellent information.

Senator GURNEY. I think the study shows —and let me say this: When the committee gets into it and uses it, any questions you may want answered to further amplify what the report says, I would be glad to get them for you.

Mr. DELLENBACK. Excellent. I think this is some of the best testimony.

Mr. THOMPSON. I gather you want us to channel the questions through you.

Senator GURNEY. Yes, if you would.

Let me sum up. I don't think the Secretary is intentionally unfair and I realize it is a matter of discretion, and I think probably he may be entirely honest when he says, "I don't have manpower for this." After all, with the freeze on employment and the policy of the Administration to cut down on Government employment at a time may leave him short-handed.

But the point I make is this: In these service contracts, the only thing you really have up for bid is wages. That is really the only factor that amounts to anything. It seems to me that we ought, as a Congress, to insist that the Labor Department have this manpower and make the studies necessary, where you are going to bid the wages, to make sure that you do have a reasonable determination of wages and a reasonable criteria before you get into that kind of a bid.

Now, there is one other thing here I think is important, too. And that is the kind of times that we now have, where we have such a service bid as this, it is inevitable that when you have companies that are economically somewhat depressed, as these aerospace companies are, and are vying for a service contract bid like this, they are going to bid everything they can down to get the contract.

So in times like this, when you really ought to protect your wages more than perhaps any other time, it is almost a clear mandate that you are going to put the wages on the auction block and bid them down if you don't have some sort of criteria to follow.

I think that is what really the aim of this committee ought to be, is to have some standard practice devised here so we won't put wages on the auction block and bid them down in awarding of service contracts. I think it is in the best interest not only of the workers but also of the Government and society as a whole. If your committee is able to make a contribution here, you certainly will have done a fine thing. Thank you very much.

Mr. THOMPSON. Mr. O'Hara.

Mr. O'HARA. I want to apologize for missing much of your testimony, Senator. I was called to the phone on an urgent matter involving my district, and I am sure you understand.

Senator GURNEY. I do.

Mr. O'HARA. You understand the amount of importance in such matters, but I wish to thank you for your interest in this matter. I heard you express your conclusions, summarize your conclusions, in the last few minutes, and I thoroughly agree with you, and I think you thought out your position very completely.

I would like to take one exception. Rather than the word "discretion" as describing the Secretary's 4(b) authority, I don't think that gives quite the right impression. He does not really have discretion to act or not as he sees fit. It circumscribes the conditions under which he is permitted to make variations, tolerances, or exceptions, and they have to do with an overriding national interest and serious impairment of Government business.

I should think one would have to make specific findings of those conditions before he could exercise authority under 4(b).

Mr. DELLENBACK. If the gentleman will yield, it is in the language of the statute at the bottom of the second paragraph which the Secretary has in the letter, using the language "prejudicial to interest," so I gather it is an "or" situation, and again I am not defending his judgment but I think it is clear that he has acted within the scope of the Act, whether we think or do not think he should have done something differently within the scope.

There is a difference between the claim of judgment which we think is not properly exercised and a charge, which nobody is making, that he failed to act properly under the law.

Mr. O'HARA. May I read Section 4(b): "The Secretary may provide such reasonable limitations and make such rules and regulations allowing reasonable variations, tolerances, and exemptions, to and from, or all provisions of this Act he may find necessary and proper in the public interest or to avoid serious impairment of the conduct of Government business." That is the language in the second paragraph of this letter.

But the question is, I would point out, not a matter of discretion simply but the Act does not say that the service contract workers shall be paid prevailing wages then the Secretary chooses to see to it that they shall, you know; it is not that wide open.

Mr. THOMPSON. If you will yield, again, in his letter of September 13 to me, he cites the limitation in 1967 under his 4(b) authority and goes on to say: "They are equally persuasive now and are reinforced by the fact that a change at this time might be prejudicial to the public interest," as distinguished from "would be prejudicial to the public interest."

So therefore, again, it is a matter of interpretation; how this would be prejudicial to the public interest is beyond my understanding. Perhaps he can come up with some explanation that has not occurred to us now.

Senator, thank you very much.

Senator GURNEY. Thank you, Mr. Chairman.

Mr. THOMPSON. It has been nice to see you again.

Senator GURNEY. Knowing some of the members of this committee personally, I think you will probably come to grips with the problem. Thank you.

Mr. THOMPSON. The subcommittee will adjourn, to meet tomorrow at 2:00 p.m.

(Whereupon, at 12 noon the subcommittee adjourned, to reconvene at 2:00 p.m. Wednesday, October 13, 1971.)

A PREPARATION FOR BICENTENNIAL CELEBRATION

Mr. HRUSKA. Mr. President, the Franklin Mint at Media, Pa., is a unique organization. It is the largest private mint in the world. It produces coins for several small nations, but of more interest to Americans is the fact that it mints millions of dollars worth of commemorative medals honoring great Americans and their achievements.

Although the mint has been in operation only 6 years, it has grown phenomenally. Hundreds of thousands of persons now collect the medals produced by the mint, commemorating great moments in our Nation's history and the great Americans who have contributed to our progress and well-being.

It is worth noting that since the mint's founder, Joseph M. Segel, struck his first commemorative medal of General Douglas MacArthur, the interest in commemorative medals has grown until sales of Franklin medals are now said to have surpassed the collector's market for U.S. coins.

The mint is now preparing to participate in the Bicentennial celebration in 1976 by sponsoring a $500,000 Bicentennial Medal Design Competition to be conducted in all 50 States.

In this program, artists in each State are invited to design an appropriate

medal commemorating their State's participation in the American heritage.

The prize fund is said to be the largest amount ever offered in art competition in the Nation.

In the thought that this design competition will be of great interest to the Nation's artists and collectors of commemorative medals, I ask unanimous consent to have printed in the RECORD the announcement of the design competition as it recently appeared in the American Bicentennial Newsletter.

There being no objection, the announcement was ordered to be printed in the RECORD, as follows:

THE AMERICAN BICENTENNIAL NEWSLETTER,
August–September 1971.

$500,000 BICENTENNIAL MEDAL COMPETITION SET

A competition for the designing of Bicentennial commemorative medals in all 50 states, with prizes totalling $500,000, was announced August 11th by the Franklin Mint, world's largest private mint. The announcement was made by the president of the company, Joseph M. Segel, at the New York City premiere of the new documentary film, "Of Art and Minting."

Artists in each state will be invited to design a Bicentennial medal commemorating their state's contributions to the heritage of the nation. There will be $10,000 in prize money for each state competition: first prize—$5,000, second prize—$2,500, third prize—$1,500, fourth prize—$1,000. The total prize fund of $500,000 is the largest amount ever offered in an art competition in the United States.

Actually, the investment in the program by the Franklin Mint will be at least one million dollars. In a telephone interview with *USA–200,* Segel said the company has budgeted an additional $500,000 for nationwide promotion and advertising in support of the 50 contests.

State Bicentennial Commissions have been invited to co-sponsor the competition in each state, and judging of the design entries will be done by state panels in cooperation with a national advisory panel of distinguished artists and art experts. In states which elect to co-sponsor the program, the Franklin Mint will defer to the Governor or State Bicentennial Commission in appointing a panel of judges.

Under varying plans of endorsement or co-sponsorship, Segel told *USA–200,* it will be possible for the individual state to receive royalties of 10 to 50 per cent generated by the public sale of the medals, for use in supporting other state Bicentennial programs. A conservative estimate of the royalties likely to be generated for distribution among participating State Bicentennial Commissions, Segel said, would be one million dollars, with the potential being considerably higher.

The fifty state competitions, to run concurrently, are scheduled to open in January 1972 and close on March 31, 1972. Segel said he anticipated that first edition proofs of the complete 50-medal set would be available by the end of September 1972. There would be later mint editions and possibly other editions sponsored by various states.

The elements of the program—the million dollar investment, the unique opportunity afforded artists, the commemorative value of the completed medals, and the prospect of substantial royalties for use in other Bicentennial activities—makes it the most significant and far-reaching act of support and commitment to the Bicentennial made by private enterprise to date.

MARKING THE 81ST BIRTHDAY OF THE PRESIDENT PRO TEMPORE

Mr. BEALL. Mr. President, permit me to wish a belated, but nonetheless hearty happy birthday to our distinguished President pro tempore, the senior Senator from Louisiana, ALLEN J. ELLENDER.

In his 35 years of service to this body, Senator ELLENDER has pursued the endless work of the Senate with unstinting vigor. As Chairman of the Committee on Appropriations, Senator ELLENDER has made a significant contribution to the Senate's ability to expedite passage of the various appropriation measures pending before it this session.

As a freshman Senator, I extend to the President pro tempore my sincerest thanks for his courtesy, his helpfulness, and most of all his warm friendship which has helped many a new member adjust to the ways of the Senate. Clearly, Senator ELLENDER plays a vital and many faceted role in the operations of this distinguished body.

My best wishes go to Senator ELLENDER as he celebrates his 81st birthday and I sincerely hope that the distinguished President pro tempore will mark many more birthdays in the service of the U.S. Senate.

CONCLUSION OF MORNING BUSINESS

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that morning business be closed and that the distinguished Senator from Wisconsin (Mr. NELSON) now be recognized for not to exceed 15 minutes, out of order.

The PRESIDING OFFICER (Mr. GAMBRELL). Is there objection to the request of the Senator from West Virginia? The Chair hears none, and it is so ordered; and, morning business is now concluded.

The Chair recognizes the Senator from Wisconsin (Mr. NELSON).

THE CONQUEST OF CANCER BILL

Mr. NELSON. Mr. President, the American Center Society and a group of private citizens called the Citizens Committee for the Conquest of Cancer are carrying on a massive advertising campaign to pressure the House of Representatives to adopt the Conquest of Cancer bill unchanged as it passed the Senate by a vote of 79 to 1.

One is moved to ask why this group feels it is necessary to buy full page advertisements in 24 newspapers, including ads in the 10 congressional districts of the House health subcommittee members, in order to arouse public support for a bill which seeks a universally approved objective, the cure of cancer.

Everyone knows a major cancer bill is going to pass and will be signed by the President.

Everyone is agreed we should expand our efforts. In fact, just in the past few months the President recommended and the Congress added $100 million to our cancer program. Additional hundreds of millions will soon be added to our scentific efforts. Not a single Member of Congress dissents from this expanded effort. In fact, everyone knows that Congress is prepared to appropriate more funds for this cause than can sensibly be spent in a scientific way.

Why then the big political propaganda campaign in behalf of a bill that is going to pass anyway?

The answer is simple enough. This group does not want the bill to be modified or changed in any way to correct what the scientific community considers a major organizational defect in the Conquest of Cancer proposal as it passed the Senate. Because they cannot win the scientific argument, they have launched a propaganda campaign at the grassroots level aimed at stampeding Congress by making a political issue of an important scientific matter.

The issue at stake is whether the National Cancer Institute which is now a vital part of an integrated and interrelated scientific complex within the National Institutes of Health should now become an independent agency reporting directly to the President and housed within the NIH for housekeeping purposes only. In the Senate bill there is only some hortatory language encouraging cooperation between the NCI and the rest of the scientific complex within NIH. If a broad integrated scientific effort among all the disciplines and biomedical sciences is critically necessary to achieve ultimate success, as everyone agrees it is, why then create a separate Cancer Institute with the hope and the prayer that we can somehow achieve the same high level of integrated scientific coordination that already exists and at the same time maintain the standard of excellence which has long been the hallmark of the National Institutes of Health as an institution. A separate and independent National Cancer Institute does not make sense from a scientific, administrative or managerial standpoint. It would weaken our efforts and dissipate our resources in this important cause which we all support.

It is interesting, in fact vital, to note that not a single scientific organization in the United States supports the concept of an independent National Cancer Institute. In fact they vigorously opposed it in testimony before the Senate and House committees. Furthermore, the Association of American Medical Colleges, representing 103 medical schools and 401 teaching hospitals, went on record at hearings in both Houses against the concept of a separate Cancer Institute.

The American Cancer Society in its advertisement asserts—

The objections to the bill have come mainly from people who do not have expert cancer knowledge.

This, plainly and simply, is a gross mistatement of fact. The printed records of testimony in both Houses is a conclusive and massive refutation of this assertion.

Whereas it is inevitable that there will be differences among scientists on important scientific questions, I cannot recall any other instance in which the scientific and medical community was in such overwhelming agreement on an

issue—and that agreement is in opposition to the concept of an independent Cancer Institute.

The only major organization that testified in favor of the separate Agency was the American Cancer Society. The American Heart Association favored a separate agency only on the stipulation that heart research receives equal status.

Scientific organizations which oppose the separate Agency bill include: The Federation of American Societies for Experimental Biology, representing six scientific societies and 11,000 scientists; the Association of American Medical Colleges, representing 103 medical schools and 401 major teaching hospitals; the American Medical Association; the National Tuberculosis and Respiratory Disease Association; the American College of Physicians; the American Association of Pathologists and Bacteriologists; the American Physiological Society; the Federation of Associations of Schools of the Health Professions; the American Hospital Association; the American Society of Biological Chemists; and the chairmen of Departments of Biochemistry at American Medical Schools. The Association of Professors of Medicine, representing 77 heads of departments of medicine, unanimously opposed the idea of a separate cancer agency at their meeting in Atlantic City last May.

The president of the American Society of Biological Chemists, Dr. Eugene P. Kennedy, in prepared testimony, stated:

It would seem highly desirable to incorporate the new program into NIH. In this way wasteful duplication of programs, competition of two separate agencies for limited funds and the expenses of two separate administrative structures would be avoided.

Dr. Philip Handler, president of the National Academy of Sciences, in a letter to Senator KENNEDY March 15, wrote:

It is my view, and that of all knowledgeable colleagues with whom I have discussed this matter, that the public purpose would be best served by utilizing this opportunity to strengthen the National Institutes of Health in a variety of ways, most particularly the National Cancer Institute, rather than create a National Cancer Authority. I know this view to be shared essentially unanimously by the membership of the Institute of Medicine of the National Academy of Sciences and by the membership of the President's Science Advisory Committee.

Handler went on to say that:

Those responsible for the proposed National Cancer Authority will find it necessary to re-invent virtually all of the National Institutes of Health within the Authority if the actual charge to the Authority is ultimately to be successful.

It is interesting to note, in conclusion, that Dr. Charles Brenton Huggins agrees with the large number of scientists, doctors, and Nobel Prize winners who oppose an independent Cancer Institute.

Dr. Huggins is the only living scientists who has been awarded the Nobel Prize in medicine and physiology for treating cancer patients. He was the first to use hormones in the treatment of cancer patients.

TRIBUTE TO DR. BARRY COMMONER

Mr. NELSON. Mr. President, with his persistence and masterful ability to communicate the scientist's art, Dr. Barry Commoner has been instrumental in making ecology a household word. Now, in a two-part series carried recently by the New Yorker magazine, his discussion of the complex economic and technological issues involved in the environmental crisis makes it clearer than ever that the drive for a livable world will never succeed on the bandaid approach of the past.

Once again, Dr. Commoner has provided a great public service in further educating Americans to the nature of the environmental crisis. "The Closing Circle" articles should prove a major contribution to the achievement of an ecological ethic in this country.

The two-part series by Dr. Commoner was carried in the September 25 and October 2 issues of the New Yorker, and I ask unanimous consent that it be printed at this point in the RECORD.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

[From the New Yorker, Sept. 25, 1971]

A REPORTER AT LARGE: THE CLOSING CIRCLE—PART I

Here, in the earth's thin skin of air, water, and soil, and the radiant solar fire that bathes it, several billion years ago life appeared and was nourished. As it grew, life evolved, its old forms transforming the earth's skin, and new ones adapting to these changes. Living things multiplied in number, variety, and habitat until they formed a global network, becoming deftly enmeshed in the surroundings they had themselves created. This is the ecosphere, the home life has built for itself on the planet's surface.

The modern mind has become accustomed to think of separate, singular events, each dependent upon a unique, singular cause. But in the ecosphere every effect is also a cause: an animal's waste becomes food for soil bacteria; what the bacteria excrete nourishes plants; animals eat the plants. Such cycles are hard to fit into human experience in the age of technology, where Machine A always yields Product B, and Product B, once used, is cast away, having no further meaning for the machine, the product, or the user. We have broken out of the circle of life, converting its endless cycles into man-made, linear events. Oil is taken from the ground, distilled into fuel, burned in an engine, converted thereby into noxious fumes, which are emitted into the air. At the end of the line is smog. Other man-made breaks in the ecosphere's cycles spew out sewage, toxic chemicals, heaps of rubbish—testimony to our power to tear the ecological fabric that has, for millions of years, sustained the planet's life. Suddenly, we have discovered what we should have known long before; that anything which fails to fit into the ecosphere is a threat to its finely balanced cycles.

There is a kind of ambiguity in our relation to the environment. Biologically, human beings participate in the environmental system as subsidiary parts of the whole. Yet human society is designed to exploit the environment as a whole to produce wealth. The paradoxical role we play in the natural environment—at once participant and exploiter—distorts our perception of it. Particularly serious is the illusion that we have "conquered nature" and no longer depend on the natural environment. A good place to experience this illusion is in a jet airplane. Safely seated on a plastic cushion, carried in a winged aluminum tube, streaking miles above the earth's surface, through air nearly thin enough to boil the blood, at a speed that almost makes the sun stand still, we find it easy to believe that we have conquered nature and have escaped from the ancient bondage to air, water, and soil. But, like the people it carries, the airplane is a creature of the earth's environment. Its engines burn fuel and oxygen produced by the earth's green plants. Traced a few steps back, every part of the craft is equally dependent on the environment. The steel came from smelters fed with coal, water, and oxygen—all nature's products. The aluminum was refined from ore with electricity, again produced by combustion of fuel and oxygen or generated by falling water. For every pound of plastic in the plane's interior, we must reckon that some pounds of coal were needed to produce the power used to manufacture it. For every manufactured part, gallons of pure water were used. Without the earth's natural environmental constituents—oxygen, water, fuel—the airplane, like man, cannot exist. The ecosphere and the multitude of living things that inhabit it supports every human activity; it is essential to our livelihoods and our lives.

How the earth was formed from the cloud of cosmic dust that produced the solar system is not yet clear. But we do know that the earth was at first a lifeless rocky mass in an atmosphere consisting largely of water vapor, hydrogen gas, ammonia, and methane. These substances are made up of the same four chemical elements that now dominate the composition of the earth's skin: hydrogen, oxygen, carbon, and nitrogen. (Water is made of two hydrogen atoms and one oxygen atom; hydrogen gas of two hydrogen atoms; ammonia of one nitrogen atom and three hydrogen atoms; methane of a carbon atom and four hydrogen atoms.) But on the earth at present these elements also occur in molecular combinations vastly more numerous and complex than the simple molecules that composed the ancient atmosphere.

The basic events that, from this beginning, generated the present skin of the earth, including its living inhabitants, are now fairly well known. Living things are made up nearly exclusively of the same four elements that compose the earth's early atmosphere. But in living things these elements take on enormously complex molecular forms, composing the class of organic compounds. The variety and complexity of organic compounds is staggering. Thus, a single protein molecule, a type of substance characteristic of all living things, consists of an elaborately convoluted network of thousands of hydrogen atoms, hundreds of carbon atoms, and lesser numbers of oxygen and nitrogen atoms. Thousands of different kinds of protein molecules, each with a distinctive atomic arrangement, occur in living things. Some idea of the enormous variety that is possible can be gained from this esoteric but illuminating fact: The weight of the combination of just one molecule of each of the different kinds of protein could exist, given the rules of protein composition, would be larger than the weight of the known universe. This means that the proteins that are actually found in living things represent only a fantastically small fraction of all the possible varieties of protein. Such complexity, variety, and selectivity are characteristic of all the other major classes of organic compounds in living things: nucleic acids, carbohydrates, fats, vitamins, and hormones. Thus, the actual chemical composition of living things is an enormously narrow selection from the range of possible chemical compositions.

What process could convert the few simple molecules in the earth's early atmosphere into the monumentaly complex yet highly selective assemblage of organic compounds that we now find in living things? For a long time, it was believed that this accomplishment—like the analogous one of composing a novel out of the letters of the alphabet—was an ability unique to living things. This would mean that life, in its full chemical competence, somehow appeared in a single spontaneous event on the earth, or

came to the earth through space from some other source. According to this view, the origin of life must have preceded the appearance of organic compounds on the earth. We now know that the reverse is true—that organic compounds were derived from the simple ingredients of the earth's early atmosphere by non-living, geochemical processes, and themselves later gave rise to life. The geochemical origin of organic compounds has been imitated in the laboratory: a mixture of water, ammonia, and methane that is exposed to ultraviolet light, an electric spark, or just heat produces detectable amounts of such organic compounds as amino acids—which, linked together, become proteins. Ultraviolet light was readily available from solar radiation on the primitive earth's surface. There is now good reason to believe that under this influence the simple compounds of the earth's early atmosphere were gradually converted into a mixture of organic compounds. Thus, to use an image favored by the originator of this theory, Professor A. I. Oparin, there appeared on the earth a kind of "organic soup."

It was within this soup that the first living things developed, two to three billion years ago. How that happened is a fascinating but poorly understood process. Fortunately, we do know enough about the characteristics of the first forms of life to establish their dependence—and their effects—on the environment. It now seems quite clear that the first forms of life were nourished by the ancient earth's organic soup. All living things require organic substances as food, which is the source both of the energy that drives them and of their own substance. The organic compounds that must have been present in the soup—for example, sugars—can readily yield energy sufficient to support life, and, together with other building blocks, such as amino acids and nucleotides, they can be formed into the huge and complex molecules of life: carbohydrates, proteins, and nucleic acids. Oxygen, as such, was lacking in the early earth's atmosphere, so that the first living things must have derived energy from organic foods without combusting them with oxygen. This type of metabolism—fermentation—is the most primitive energy-yielding process in living things. All present forms of life, including those which depend on oxygen, can carry out fermentation on organic compounds to some degree. However, life could not have survived in this form, for it would have soon consumed the earth's original organic soup. Survival became possible because of a timely evolutionary development: the emergence of photosynthetic organisms. These new organisms—the first green plants—used sunlight to combine carbon dioxide and inorganic materials into fresh organic matter. This crucial event reconverted the first life forms' waste, carbon dioxide, into their food—organic compounds. It closed the circle and transformed what was a fatally linear process into a looped, self-perpetuating one. Since then, the presence and expansion of life on the earth has been linked to a virtually inexhaustible source of energy—the sun.

This, in its primitive form, is the grand scheme that has perpetuated life on the earth: the dependence of one life process on another; the mutual, interconnected development of the earth's life system and the non-living constituents of the environment; the repeated transformation of the materials of life in great cycles, driven by the energy of the sun. This evolutionary history can be summarized in a series of propositions about the nature of life and its relation to the environment: Living things, as a whole, emerged from the non-living skin of the earth. Life is a very powerful form of chemistry, which, once on the earth, rapidly changed its surface. Every living thing is intimately dependent on its physical and chemical surroundings, so, as these changed, new forms of life, suited to the new surroundings, emerged. Life begets life, so that once new forms appeared in a favorable environment they could proliferate and spread until they occupied every suitable environmental niche within physical reach. Every living thing is dependent on many others, either indirectly, through the physical and chemical features of the environment, or directly, for food or a sheltering place. Within every living thing on the earth—indeed, within each of its individual cells—is contained another network (as complex, on its own scale, as the environmental system), made up of numerous intricate molecules, elaborately interconnected by chemical reactions, on which the life properties of the whole organism depend.

Unfortunately, we in the scientific community are not well prepared to deal with interconnections of this kind. We have been trained by modern science to think about much simpler events—how one particle bounces off another, or how Molecule A reacts with Molecule B. Confronted by a situation as complex as the environment and its vast array of living inhabitants, we are likely—some more than others—to attempt to reduce it in our minds to a set of separate simple events, in the hope that their sum will somehow represent the whole. This is an illustory hope. For some time now, biologists have studied animals isolated in cages, and biochemists have studied molecules isolated in test tubes, accumulating the vast, detailed literature of modern biological science. Yet these separate data have yielded no sum that explains why the air reeks and the water is foul.

I make this confession as a preliminary to my own effort, in what follows, to describe the environmental system in a way that may help us understand the present crisis. The confession is intended as a reminder that we have so long neglected the task of studying complex natural processes, such as those in the environment, that our methods of approaching them are still crude and uncertain. Consider the numerous ways of thinking about the environment. First, there is its spatial complexity: How can we encompass in a unifying idea the existence, as a stable, continuing entity, of the richly populated, kaleidoscopic ambience of a tropical jungle and the seemingly dead, unchanging desert? Then there is the multiplicity of living things in the environment: What common features can explain the environmental behavior of a mouse, a hawk, a trout, an earthworm, an ant, the bacteria of the human intestine, and the algae that color Lake Erie green? Then there is the variety of biochemical processes that not only are internal to every living thing but also mediate its interactions with other living things and with the environment: How can we hold within a single set of ideas photosynthesis, the fermentative decay of organic matter, oxygen-requiring combustion, and the intricate chemical dependence of one organism on another that leads to parasitism? Each of these questions, representing a separate view of the environmental system, is only a narrow slice through the complex whole. While each can illuminate some features of the whole system, the picture it yields is necessarily false to some degree. For in looking at one set of relationships we inevitably ignore a good deal of the rest, yet in the real world everything in the environment is connected to everything else.

One interesting slice through the environmental network can be taken by tracing the movement of chemical elements that participate in it. There are a hundred-odd chemical elements, and every chemical compound consists of molecules in which two or more elementary atoms are linked together. So nitrogen gas (as in the air) consists of molecules made up of two linked nitrogen atoms; the molecules of oxygen gas (also in the air) consist of two linked oxygen atoms; carbon-dioxide molecules consist of a carbon atom combined with two oxygen atoms; sulphur dioxide has an analogous composition; and so on. A distinction is made between two great classes of compounds: inorganic and organic. Organic compounds were first discovered exclusively in juices of living things (grapes, for example), as against non-living parts of the earth, such as the air or rocks. As the chemical compositions of organic compounds were worked out, it became apparent that all of them contained carbon atoms, linked together in chains (straight or branched) or in rings. Other atoms common in the organic compounds found in living things are hydrogen, oxygen, and nitrogen, and, less frequently, phosphorus, sulphur, and certain metals. Carbohydrates, such as sugar, starch, and cellulose, as well as proteins, fats, nucleic acids, vitamins, and hormones are all organic compounds. Common salt, nitrates, and phosphates lack carbon and are classed as inorganic compounds. Carbon dioxide is usually considered inorganic, because of its simplicity. Chemists have learned how to synthesize organic compounds, and the variety and complexity of man-made organic substances are vast and growing.

Among the chemical elements that participate in ecological cycles, nitrogen plays a leading role, and its track through the environmental network is illuminating. About eighty per cent of the earth's nitrogen is in the air, as chemically inert nitrogen gas. Of the remaining twenty per cent, a good deal is part of the soil's humus, a very complex organic substance. Another significant fraction is contained in living things—almost entirely as part of organic compounds. Nitrogen can enter the soil from the air through nitrogen fixation—a process carried out by various bacteria and algae, some of them living free in the soil and other associated with the roots of legumes, like clover, or with the leaves of some tropical plants. Nitrogen also enters the soil from the decay of plant matter and of animal wastes. Much of it eventually becomes incorporated into humus. Humus slowly releases nitrogen through the action of soil micro-organisms that convert it into nitrate, a chemical grouping consisting of a nitrogen atom joined to three oxygen atoms. The nitrate is then taken up by the roots of plants and is made into protein and other vital parts of the plants. In nature, the plants become food for animals, whose wastes are returned to the soil, completing the cycle. The plants' roots play a crucial role in this cycle. They extract nitrate from the soil water, using oxygen to drive the combustion processes that yield the needed energy. Oxygen penetrates the soil from the air, through a network of small air spaces created by the spongy structure of humus. Thus, the soil's humus content governs its porosity and the efficiency with which the roots absorb nitrate and other nutrients.

Consider the implications of two sets of relationship that have just been described: one, the over-all movement of nitrogen atoms through the soil cycle; the other, the interdependence of the plants' efficient growth and the structure of the soil. Note that the two cycles are not of the same sort. One describes the literal movement of a physical entity, the nitrogen atom; the other is more abstract, involving a set of dependencies of one process on another. The two cycles are strongly connected at a single point—humus. In one cycle, humus is the major storehouse of soil nitrogen for plant growth; in the other, it is responsible for the physical condition of the soil that enables the efficient use of nutrients, including nitrogen released from the humus. This duality in the role of humus in the soil amplifies the effects of changes in soil condition. That is, if the soil's humus content declines, the

availability of nitrate for plant growth is reduced, and since the efficiency of nitrate absorption by the roots falls at the same time, the effect of humus on plant growth is self-accelerating. Or, to put it another way, adequate soil humus insures not only a good supply of nutrient nitrogen but also its thrifty use by the plant. Any environmental agent that, like humus, links two or more cycles is almost certain to play a powerful role in the system as a whole. Such a link enhances the complexity of the system, the fineness of its network, and thereby contributes to its stability. For this reason, when such a link is weakened the ecological fabric is likely to unravel. To appreciate the crucial significance of a link such as humus, one must, of course, see it in its two roles simultaneously. Unfortunately, this type of vision is not fostered by the kind of specialization that isolates biologists into separate camps: experts either on soil structure or on plant nutrition. The tendency to consider only one thing at a time is a chief reason we have failed to understand the environment and have blundered into destroying it.

The movement of nitrogen in aquatic ecosystems is also significant. Again the movement is cyclical through a sequence of steps: fish produce organic wastes; decay microorganisms working upon these wastes release nitrogen from organic forms and combine it with oxygen to form nitrate; this is reconverted to organic forms by algae; algal organic matter nourishes small aquatic animals; these are eaten by the fish. The balance between the rate of decay of organic materials and the rate of algal growth determines the concentration of nitrate in the water. In nature, little nitrate reaches the water from the soil, because of its thrifty use in the soil cycle. As a result, the nitrate content of natural surface water is very low (on the order of a part per million) and the algal population is correspondingly low; the water is clear and—unless man intervenes to upset the balance—remains largely free of noxious organic debris.

Of the three great ecological arenas—soil, water, and air—the air is the largest, the most uniform across the globe, and the one affected least directly by biological action. In nature, the composition of air is remarkably uniform: nearly eighty per cent nitrogen gas, about twenty per cent oxygen gas, with a very low concentration of carbon dioxide (about .03 per cent), very much lower concentrations of a few rare gases, such as helium, neon, and krypton, and variable amounts of water vapor. Like everything else on earth, the behavior of the sea of air is governed by cycles, but in general these involve physical phenomena rather than chemical or biological ones. On a short time scale, the air cycle is simply what we call weather. The weather cycle is driven by the sun's energy, which bathes the earth incessantly. Any substance on the earth's surface that absorbs solar energy—for example, soil—is warmed by it unless the energy causes a change in the state of the substance. Energy absorbed by ice, a solid, instead of warming it can convert it to the liquid state—water. Energy absorbed by water either warms it or converts it to the gaseous state—water vapor. If the energy-absorbing material is readily changed in state—for example, the water in the ocean—a considerable part of the solar energy can be absorbed without raising the temperature. So, after a sunny day the sand is hot and the water relatively cool. During the day, the air above the hot sand, being warm and light, rises; the cooler air over the water flows in to take its place; there is a cool on-shore breeze.

A good deal of the solar energy absorbed by the oceans, which cover two-thirds of the earth's surface, is taken up by the conversion of liquid water to water vapor—the process of evaporation. Every gram of water vapor carried in the air embodies a fixed amount of solar energy—about five hundred and thirty-six calories per gram. When the reverse process—condensation of water vapor into liquid—occurs, this energy is released. During hot summer days in the Caribbean, the air is filled with water vapor. As the water vapor rises from the earth's surface, it strikes the cold air of the stratosphere and begins to condense, forming rain. For every gram of water vapor that condenses to rain, five hundred and thirty-six calories of energy are released. This heats the air, causing it to rise; cool air rushes in near the surface to replace the rising hot air—winds are created. This is the origin of Caribbean hurricanes.

For our purpose, the main thing to keep in mind about the daily changes in the air that bathes the earth is that the weather is a means of moving the air mass that covers a particular locale, such as a city, and a means of washing airborne materials, such as pollutants, out of it. The weather keeps the air clean. Anything that becomes airborne, caught by the weather, is eventually brought to earth, where it enters the environmental cycles that operate in the water and the soil. If there is little air movement, whatever is introduced into the air by local activities—for example, smog—tends to accumulate in the air. Still-air conditions have a way of perpetuating themselves. When air is still, it tends to develop into an upper zone of warm air and a lower zone of cold air. This reverses the usual situation, in which the lower layers of air are warmer than the upper ones, and it is therefore called an inversion. Since cold air is denser than warm air, vertical circulation is prevented under inversion conditions. An inversion may hold the air mass over a city in place for some days. When that happens, as it did in New York City in November, 1966, pollutants may accumulate to the point of emergency. These weather changes are chiefly in the lower reaches of the atmosphere—the layer extending forty or fifty thousand feet above the earth's surface. Above this layer is the stratosphere, where there is almost no moisture—no clouds, no rain or snow. If things that enter the air are light enough to escape into the stratosphere, they may remain there for a long time. Some of the radioactive debris produced by nuclear explosions is associated with very light particles, and they may remain in the stratospere for months.

Over a long period of time, changes in the composition of the air can have strong effects on the amount and kind of solar radiation that reaches the earth's surface. These effects are brought about by changes in the amounts of airborne dust particles, water vapor, clouds, carbon dioxide, and ozone. Generally, water vapor and clouds have a shielding effect; solar radiation is scattered by water droplets, and much of it may then fail to reach the earth. This is why cloudy conditions tend to reduce the earth's temperature. Carbon dioxide has a special effect, because it is transparent to most of the sun's radiation except that in the infrared region of the spectrum. In this respect, carbon dioxide is like glass, which transmits visible light but reflects infrared—the properties that make glass so useful in a greenhouse in the winter. Visible energy enters through the glass, and is absorbed by the soil in the greenhouse and converted to heat, which is reradiated from the soil as infrared energy. But when this infrared energy reaches the greenhouse glass, it is bounced back and held within the greenhouse as heat. This is why an otherwise unheated greenhouse is so warm on a sunny winter day. Like glass, the carbon dioxide in the air that blankets the earth acts as a giant energy valve. Visible solar energy passes through it; reaching the earth, much of this energy is converted to heat, but the resultant infrared radiation is kept within the earth's air blanket by the heat-reflecting property of carbon dioxide. Thus, the higher the carbon-dioxide concentration in the air the larger the proportion of solar radiation retained by the earth as heat. In the early period of the earth's existence, the carbon-dioxide concentration was high, and, accordingly, the average temperature of the earth approached the tropical. Then, as great masses of plants used carbon dioxide in the formation of vegetation—which eventually fossilized as coal, oil, and gas—the earth became cooler. Now that we are burning these fossil fuels and releasing their carbon dioxide, the carbon-dioxide concentration of the atmosphere is rising, and may have an effect on the earth's temperature.

Another constituent of the air, ozone, plays a special role in governing the radiation that is received at the earth's surface. A chemically reactive molecule composed of three atoms of oxygen joined in a triangle, ozone is a good absorber of ultraviolet radiation. It is formed from oxygen, but since it reacts vigorously with substances near the earth's surface, it is present only in the upper reaches of the stratosphere. When the earth's atmosphere acquired its oxygen from the photosynthetic activity of green plants, the planet also acquired a high-altitude blanket of ozone. Before that, the earth's surface had been bathed in intense ultraviolet radiation; indeed, this was the energy source that converted the early earth's blanket of methane, water, ammonia, and hydrogen gas into the soup of organic compounds in which the first living things originated. However, ultraviolet radiation is very damaging to the delicate balance of chemical reactions in living cells, and it is likely that the first living things survived only by growing in a layer of water sufficiently thick to protect them from the ultraviolet radiation that reached the earth's surface. Not until oxygen was formed, and, with it, the protective layer of ozone, was the intensity of ultraviolet radiation on the earth's surface reduced sufficiently to allow living things to emerge from the water and begin to inhabit the earth's surface. The continued existence of terrestrial life is dependent on the layer of ozone in the stratosphere—a protective device that is itself a product of life. A reduction of the ozone in the stratosphere would put terrestrial life under a serious threat from solar ultraviolet radiation. This threat has been raised by the SST.

In broad outline, these are the sort of environmental cycles that govern the behavior of the three great global systems—the soil, the water, and the air. Within each of the systems are found many thousands of different species of living things. Each species is suited to its particular environmental niche, and each, through its life processes, affects the physical and chemical properties of its immediate environment, including the life processes of other living species. These relationships are bewildering in ther variety and marvelous in their intricate detail. An animal—say, a deer—may depend on plants for food; the plants depend on the action of soil bacteria for their nutrients; the bacteria, in turn, live on the organic wastes dropped on the soil by animals; at the same time, the deer is food for the mountain lion. Insects may live on the juices of plants or gather pollen from their flowers. Other insects may suck blood from animals. Bacteria may live on the internal tissues of animals and plants. Fungi break down the tissues of dead plants and animals. All this, many times multiplied, and organized, species by species, in intricate, precise relationships, makes up the cast network of life on the earth.

The science that studies these relationships and the processes linking each living thing to the physical and chemical environment is ecology—the science of planetary housekeeping. It is a young science, and much of what it includes has been learned from

studies of only small segments of the network of life on the earth. Ecology has not yet explicitly developed cohesive, simplifying generalizations such as are exemplified by the laws of physics. Nevertheless, a number of generalizations are evident in what we already know about the ecosphere, and these can be organized into an informal set of laws of ecology.

The First Law of Ecology: Everything Is Connected to Everything Else. The fact that an ecosystem consists of multiple interconnected parts that act on one another has some surprising consequences. Our ability to picture the behavior of such systems has been helped considerably by the development, even more recent than ecology, of the science of cybernetics. We owe the basic concept to the inventive mind of the late Norbert Wiener. "Cybernetics" derives from the Greek word for helmsman; it is concerned with cycles of events that steer, or govern, the behavior of a system. The helmsman is part of a system—the ship—that also includes the compass and the rudder. If the ship veers off the chosen compass course, the change shows up in the movement of the compass needle. Observed and interpreted by the helmsman, this event determines a subsequent one: the helmsman turns the rudder, which swings the ship back onto its original course. When this happens, the compass needle returns to its on-course position, and the cycle is complete. If the helmsman turns the rudder too far in response to a small deflection of the compass needle, the excess swing of the ship shows up in the compass, signalling to the helmsman to correct his overreaction by an opposite movement. Thus, the operation of the cycle stabilizes the course of the ship.

In a similar way, stabilizing cybernetic relations are built into an ecological cycle. Consider, for example, the fresh-water ecological cycle of fish, organic waste, bacteria of decay, inorganic products, algae, fish. Suppose that, owing to unusually warm summer weather, there is a rapid growth of algae. This depletes the supply of inorganic nutrients, so that two sectors of the cycle—algae and nutrients—are out of balance, but in opposite directions. The operation of the ecological cycle, like that of the ship, soon brings the situation back into balance. For the excess of algae increases the case with which fish can feed on them, and this reduces the algal population, increases fish-waste production, and eventually leads to an increased level of nutrients when the waste decays. Thus, the levels of algae and nutrients tend to return to their original, balanced position.

In such cybernetic systems, the course is maintained not by rigid control but flexibly, just as the ship does not move unwaveringly on its path but swings first to one side of the true course and then to the other. The frequency of its swings depends on the relative speeds of the various steps in the cycle, such as the rate at which the ship responds to the rudder. Ecological systems exhibit comparable swings, although these are often obscured by the effects of daily or seasonal variations in weather and other environmental agencies. The most famous examples of such ecological oscillations are the periodic fluctuations in the size of fur-bearing-animal populations. For example, from trapping records in Canada it is known that the populations of rabbits and lynx follow ten-year fluctuations. When there are many rabbits, the lynx prosper; the rising population of lynx increasingly ravages the rabbit population, reducing it; as the rabbits become scarce, there is insufficient food to support the now numerous lynx; as the lynx begin to die off, the rabbits are less fiercely hunted and increase in numbers. And so on. These oscillations are built into the operation of the simple cycle, in which the lynx population is positively related to the number of rabbits and the rabbit population is negatively related to the number of lynx. In such an oscillating system, there is always danger that an oscillation will swing so wide of the balance point that the system can no longer compensate for it and the system will collapse. Suppose, for example, that in one particular swing of the rabbit-lynx cycle the lynx manage to eat all the rabbits (or, for that matter, all but one). Now the rabbit population can no longer reproduce. As usual, the lynx begin to starve as the rabbits are consumed, but this time the drop in the lynx population is not followed by an increase in rabbits. The lynx then die off. The entire rabbit-lynx system collapses.

This is similar to the ecological collapse that accompanies eutrophication. If the nutrient level of lake water becomes so high as to stimulate the rapid growth of algae, the dense algal population cannot be long sustained, because of an intrinsic limitation in photosynthetic efficiency. As the thickness of the algal layer in the water increases, insufficient light for photosynthesis reaches the lower parts of the algal layer. Thus, any strong overgrowth of algae very quickly dies back, releasing organic debris. The level of organic matter may then become so great that its decay—which is to say its combining with oxygen to form nitrate and other inorganic substances—totally depletes the oxygen content of the water. The bacteria of decay, which need oxygen to survive, then die off. The entire aquatic cycle collapses.

The dynamic behavior of a cybernetic system—that is, the frequency of its natural oscillations, the speed with which it responds to external changes, and its over-all rate of operation—depends on the relative rates of its constituent steps. In the ship system, the compass needle swings in fractions of a second; the helmsman's reaction takes some seconds; the ship responds over a period of minutes. In the aquatic ecosystem, each biological step also has a characteristic reaction time, which depends on the metabolic and reproductive rates of the organisms involved. The time to produce a new generation of fish may be some months; for algae it is a matter of days; decay bacteria can reproduce in a few hours. The metabolic rates of these organisms—that is, the rates at which they use nutrients, consume oxygen, produce waste—is inversely related to their size. If we call the metabolic rate of a fish one, the algae rate is about a hundred and the bacterial rate about ten thousand. If the entire cyclical system is to remain in balance, the over-all rate of turnover must be governed by the slowest step—in this case, the growth and metabolism of the fish. Any external occurrence that forces part of the cycle to operate faster than the over-all rate leads to trouble. For example, the rate of waste production by fish determines the rate of bacterial decay and the rate of oxygen consumption in the course of that decay. In a balanced situation, enough oxygen is produced by the algae and enters from the air to support the decay bacteria. But suppose that the rate at which organic waste enters the cycle is increased artificially—for example, by the dumping of sewage into the water. Now the decay bacteria are supplied with organic waste at a much higher level than usual. Because of their rapid metabolism, they are able to act quickly on the increased organic load. As a result, the rate of oxygen consumption by the decay bacteria can easily exceed the rate of oxygen production by the algae (and the rate of the entry of oxygen from the air), so the oxygen level goes to zero and the system collapses. Thus, the rates of the separate processes in the cycle are in a natural state of balance that is maintained only as long as there is no overwhelming external intrusion on the system Such an intrusion, because it is not controlled by the self-governing cyclical relations, is a threat to the stability of the whole system.

Ecosystems differ considerably in their rate characteristics and therefore vary a great deal in the speed with which they react to changed situations or approach the point of collapse. For example, aquatic ecosystems turn over much faster than a soil ecosystem; an acre of richly populated marine shoreline annually produces about seven times as much organic material as an acre of alfalfa. The slow turnover of the soil cycle is due to the rather low rate of one of its many steps—the release of nutrient from the soil's organic store, which is very much slower than the corresponding step in the aquatic system.

The amount of stress an ecosystem can absorb before it is driven to collapse is also a result of its various interconnections and their relative speeds of response. The more complex the ecosystem, the more successfully it can resist a stress. For example, in the rabbit-lynx system, if the lynx had an alternative source of food they might survive the sudden depletion of rabbits. In this way, branching—the establishing of alternative pathways—increases an ecosystem's resistance to stress. Most ecosystems are so complex that the cycles are not simple circular paths but are crisscrossed with branches to form a network, or a fabric, of interconnections. Like a net, in which each knot is connected to others by several strands, such a fabric can resist collapse better than a simple circle of threads, which if it is cut anywhere breaks down as a whole. Environmental pollution is often a sign that ecological links have been cut, and that the ecosystem has been artifically simplified and made more vulnerable to stress and to final collapse.

A typical food chain begins with microscopic algae; these are eaten by small fish, which, in turn, are eaten by game fish, which are finally taken by a bird of prey or man. As a result, there is a kind of pyramid of consumption, in which the biggest animal, at the top, is sustained by a great mass of smaller organisms, lower down. One consequence of this relationship is that when any substance that, unlike ordinary body substances, is not metabolized (for example, a pesticide or mercury) enters the food chain, it becomes increasingly concentrated as it moves toward the top. For example, when Clear Lake, California, was treated with the persistent, non-metabolized insecticide DDD, the water was found to contain from fifty to seventy parts of the insecticide per million. In the microscopic algae, DDD concentrations were about two hundred and fifty times as great; in small fish, the concentration was about five hundred times as great as it was in the water; and in large fish the concentration of DDD was eighty thousand times that of the lake water.

All this results from the simple fact about ecosystems that everything is connected to everything else. The system is stabilized by its dynamic, self-compensating properties, but these same properties, if they are subjected to undue stress, can lead to a dramatic collapse. The complexity of the ecological network and its intrinsic rate of turnover determine how great a stress it can endure, and for how long, without collapsing. And the ecological network is an amplifier, so that a small perturbation in one place may have large, distant, long-delayed effects.

The Second Law of Ecology: Everything Must Go Somewhere. This is, of course, simply an informal restatement of a basic law of physics—that matter is indestructible. Applied to ecology, the law means that in nature there is no such thing as waste. In every natural system, what is excreted by one organism as waste is taken up by another as food. Animals release carbon dioxide as a respiratory waste; this is an essential nutrient for green plants. Plants excrete oxygen, which is used by animals. Animal organic wastes nourish the bacteria of decay. The waste of the bacteria—inorganic materials such as nitrate, phosphate, and carbon dioxide—become algal nutrients.

A persistent effort to answer the question "Where does it go?" can yield a surprising amount of valuable information about an ecosystem. Consider, for example, the fate of a household item that contains mercury —a very toxic substance, with serious environmental effects that have only recently been recognized. A dry-cell battery containing mercury is bought, used to the point of exhaustion, and then thrown out. But where does it really go? First it is put in a container of rubbish; this is collected and taken to an incinerator. Here the mercury is heated and converted into mercury vapor, which is emitted by the incinerator stack. Mercury vapor is carried by the wind, and is eventually brought to earth in rain or snow. Entering a mountain lake, let us say, the mercury condenses and sinks to the bottom. Here it is acted on by bacteria, which convert it to methyl mercury. This is soluble and is taken up by fish; since it is not metabolized, the mercury accumulates in the organs and the flesh of the fish. The fish are caught and eaten by men and the mercury becomes deposited in their organs. This is an effective way to trace out an ecological path. It is also an excellent way to counteract the prevalent notion that something regarded as useless simply "goes away" when it is discarded. Nothing "goes away;" instead, it is transferred from place to place, converted from one molecular form to another, acting on the life processes of any organism in which, for a time, it is lodged. One of the chief reasons for the present environmental crisis is that large amounts of material have been extracted from the earth, converted into new forms, and discharged into the environment without anyone's taking into account the fact that everything has to go somewhere. The result, too often, is the accumulation of harmful amounts of material in places where, in nature, they do not belong.

The Third Law of Ecology: Nature Knows Best. In my experience, this principle is likely to encounter considerable resistance, for it appears to contradict a strongly held idea about the unique competence of human beings. One of the most pervasive features of modern technology is the notion that it is intended to "improve on nature" —to provide food, clothing, shelter, and means of communication and expression that are superior to those available to man in nature. Stated boldly, this third law of ecology holds that any major man-made change in a natural system is likely to be detrimental to that system. This is a rather extreme claim; nevertheless, I believe that it has a good deal of merit, if it is understood in a properly defined context.

Suppose you were to open the back of your watch, close your eyes, and poke a pencil into the exposed works. The almost certain result would be damage to the watch—almost certain, but not absolutely so. There is some possibility, however small, that the watch was out of adjustment and that the random thrust of the pencil would happen to make the precise change needed to improve it. However, this outcome is exceedingly improbable. The reason is self-evident. There is a very considerable amount of what technologists now call research and development (or, more familiarly, r. and d.) behind the watch. This means that over the years numerous watchmakers, each taught by a predecessor, have tried out a huge variety of detailed arrangements of watchworks, have discarded those that were not compatible with the over-all operation of the system, and have retained the better features. In effect, the watch mechanism, as it now exists, represents a very restricted selection from among an enormous variety of possible arrangements of its components. Any random change made in the watch is likely to fall into the very large class of inconsistent or harmful arrangements that have been tried out in past watchmaking experience and discarded. One might say, as a law of watches, that "the watchmaker knows best."

There is a close analogy in biological systems. It is possible to induce random, inherited changes in a living thing by treating it with an agent, such as X-rays, that increases the frequency of mutations. Generally, exposure to X-rays increases the frequency of all the mutations that have been observed—though very infrequently—in nature and can therefore be regarded as possible changes. What is significant for our purpose is the universal observation that when mutation frequency is enhanced by X-rays, or other means, nearly all the mutations are harmful to the organisms, and the great majority are so damaging as to kill the organisms before they are fully formed. In other words, a living organism that is forced to undergo a random change in its organization is, like a watch, almost certain to be damaged rather than improved. And in both cases the explanation is the same—a great deal of r. and d. In effect, there are several billion years of r. and d. behind every living thing. In that time, a staggering number of new individual living things have been produced, each of them affording an opportunity to try out the suitability of some random genetic change. If the change damages the organism, the organism is likely to die before the change can be passed on to future generations. In this way, living things accumulate a complex organization of compatible parts, and those possible arrangements that are not compatible with the whole are screened out in the long course of evolution. Thus, the structure of a present living thing or the organization of a current natural ecosystem is likely to be "best," in the sense that it has been so heavily screened for disadvantageous components that any new one is likely to be worse than the present ones.

This principle is particularly relevant to the field of organic chemistry. Living things are composed of many thousands of different organic compounds, and it is sometimes imagined that at least some of these might be improved upon if they were replaced by man-made variants of the natural substances. The third law of ecology suggests that the artificial introduction of an organic compound that does not occur in nature is very likely to be harmful. The varieties of chemical substances that are actually found in living things are vastly more restricted than the varieties that are possible. Obviously, a fantastically large number of protein types are not made by living cells, although many of these possible protein types were once formed in some particular living things, found to be harmful, and rejected through the death of the experimental subject. Living cells synthesize fatty acids—a type of organic molecule that contains carbon chains of various lengths—whose chains have even numbers of carbon atoms (two, four, six, etc.) but synthesize no fatty acids with odd numbers of carbon atoms in their chains. This suggests that the latter have at some point been tried out and found wanting. Similarly, organic compounds that contain attached nitrogen and oxygen atoms are very rare in living things. This fact should warn us that the artificial introduction of substances of this type could be dangerous. And that is indeed the case; such substances are usually toxic and frequently carcinogenic. And I would suppose from the fact that DDT is nowhere found in nature that somewhere, at some time in the past, some unfortunate cell synthesized this molecule—and died.

One of the striking facts about the chemistry of living systems is that for every organic substance that is produced by a living organism there exists somewhere in nature an enzyme capable of breaking that substance down. In nature, that is, no organic substance is synthesized unless there is provision for its degradation; recycling is enforced. When a man synthesizes an organic substance with a molecular structure that departs significantly from the types occurring in nature, the probability is that no degradative enzyme exists and that the material will accumulate.

These considerations suggest that it would be prudent to regard every man-made organic chemical that has a strong effect on any one organism as potentially dangerous to other forms of life. In practice, this means that all man-made organic compounds that are at all active biologically ought to be treated as we treat drugs—or, rather, as we *should* treat them. That is, prudently, cautiously. Such caution or prudence is, of course, impossible when billions of pounds of the substance are produced and broadly disseminated into the ecosystem, where it can reach and affect numerous organisms not under our observation. Yet this is precisely what has been done with detergents, pesticides, and herbicides.

The Fourth Law of Ecology: There Is No Such Thing As a Free Lunch. In my experience, this idea has proved so illuminating for environmental problems that I am borrowing it from its original source, economics. The law derives from a story that economists like to tell about an oil-rich potentate who decided that his new wealth needed the guidance of economic science. Accordingly, he ordered his advisers, on pain of death, to produce a set of volumes containing all the wisdom of economics. When the tomes arrived, the potentate was impatient and issued a second order—to reduce all the knowledge of economics to a single volume. The story goes on in this vein until the advisers are required, if they are to survive, to reduce the totality of economic science to a single sentence. This sentence is the "free-lunch" law.

In ecology, as in economics, the law is intended to warn us that every gain is won at some cost. In a way, this ecological law embodies the three previous laws. Because the global ecosystem is a connected whole, in which nothing can be gained or lost, and which is not subject to over-all improvement, anything extracted from it by human effort must be replaced. The payment of this price cannot be avoided.

Our experience with nuclear power, for example, tells us that modern technology has achieved a scale and an intensity that begin to match those of the global system in which we live. But it also reminds us that we cannot wield this power without deeply intruding on the delicate environmental fabric that supports us, and it warns us that our ability to intrude on the environment far outstrips our knowledge of the consequences. It tells us that every environmental incursion, whatever its benefits, has a cost.

Air pollution is not merely a nuisance and a threat to health. It is a reminder that our most celebrated technological achievements—the automobile, the jet plane, the power plant, industry in general, and indeed, the modern city itself—are, in the environment, costly failures.

The same pattern may be found in the effects of our pollution of water, as in the eutrophication of Lake Erie, where we have grossly—and, I believe, irreversibly—changed a source of great ecological wealth. And what we have done to our air and water we are now doing to our soil.

Decatur, Illinois, which provides a striking case history of soil pollution, is a quiet city of a hundred thousand people, lying in the open farmland of Illinois about a hundred and twenty miles from the nearest large city, St. Louis. There are only a few local industries, none of them very serious polluters. It might seem an unlikely place to find evidence of the environmental crisis. Yet Decatur now confronts a pollution problem as

serious in its potential human hazards, and as far-reaching in its significance for the United States and the world, as air pollution in Los Angeles.

There was no evidence of environmental trouble in Decature until a few years ago, when the local health department received a sample of water for a routine test for nitrate content. The department conducted such tests chiefly as a service to surrounding farms. For a number of years, it had been known that shallow wells on farms in the Midwest often contained nitrate above the levels recommended by public-health authorities. Nitrate itself appears to be relatively innocuous in the human body. However, it can be converted to nitrite by the action of certain intestinal bacteria, which are often more active in infants than in adults. And nitrite, a grouping of one nitrogen and two oxygen atoms, is poisonous, for it combines with hemoglobin in the blood, converting it to methemoglobin, and so prevents the transport of oxygen by the blood. An infant thus affected turns blue and is in serious danger of asphyxiation and death. The problem with the wells was discovered some years ago by physicians in Missouri, and since then health officials have been alert to it, warning farmers to use a new water supply when their wells exceed the recommended nitrate level—forty-five parts per million. The problem is worldwide; infant methemoglobinemia from excessive nitrate has been reported in France, Germany, Czechoslovakia, and Israel. The Macon County health department found that the sample in question exceeded the recommended limit somewhat, but this was not surprising, since nitrate-polluted wells are fairly common in the area. However, the citizen who had submitted the sample then informed the health department that the sample came not from a farm well but from the Decatur city water supply. The city obtains its water from Lake Decatur, an impoundment of the Sangamon River, and tests quickly showed that both the lake water and the river water had a nitrate level at about the recommended limit. This was in the spring. By summer, the level had declined considerably, but it rose again in the winter, so that in the following spring months it had again reached a potentially dangerous nitrate level. Since then, the cycle has been repeated, and the city faces a serious, and as yet unsolved, public-health problem.

I learned all this from Leo Michel, the Public Health Administrator of Macon County, in Decatur, who called me in St. Louis, where I was teaching a course at Washington University on environmental problems, among them the general behavior of nitrogen in the ecosphere. The Decatur situation was discussed in class, and since students these days are actively concerned with the relevance of science to public affairs, it was perhaps not surprising that one student, who happened to live in Illinois, telephoned the Decatur newspaper to report the water situation. After the facts were confirmed by the health department, the paper published the news that in recent months the city's water supply had been polluted with excessive nitrate, and that fertilizer used on the surrounding farmlands was a possible source of the pollution.

The newspaper account agitated a number of people. Intensive use of inorganic nitrogen fertilizer has become the mainstay of farms in the Decatur area, as it has in many other parts of the world. Since 1945, the costs to the American farmer of most of his needed resources—land, labor, machinery, and fuel—have increased considerably in relation to the cash value of his crops. On the other hand, the relative cost of fertilizer has declined significantly. As a result, the farmer receives his greatest economic return, per dollar invested, from the use of nitrogen fertilizer. If public-health considerations should force a reduction in the use of this type of fertilizer, farmers might face economic ruin. To appreciate how acutely this conflict affects the farmers of Illinois, it is necessary to understand agricultural conditions in that area. Illinois is in the great corn belt of the United States, and corn is an avid consumer of soil nitrogen. The nitrogen available from the natural fertility of the soil has declined since farming began in the area. Under natural conditions, a rather large store of humus nitrogen is maintained in the soil by the addition of the organic remains of plants and the bodily wastes of animals. Organic nitrogen is also formed there by the fixation of nitrogen taken from the air and acted upon by certain soil bacteria. When the soil is heavily cropped and the crop is removed from the land and sold, rather than fed to animals, the supply of humus nitrogen necessarily declines. However, crop yields can be increased considerably by the artificial addition of inorganic nitrogen to the soil. In Illinois, the total annual use of inorganic nitrogen as fertilizer increased from less than ten thousand tons in 1945 to about six hundred thousand tons in 1967, and the increasing use of nitrogen fertilizer has greatly improved the yield of corn per acre. Between 1945 and 1948, when very little fertilizer was used, the average annual corn yield was about fifty bushels per acre; in 1958, when about a hundred thousand tons of fertilizer was used, the average corn yield was about seventy bushels per acre—an increment of twenty bushels per acre in yield in response to a fertilizer increment of about a hundred thousand tons per year. In 1965, four hundred thousand tons of nitrogen was used to obtain an average yield of about ninety-five bushels per acre—a fertilizer increment of three hundred thousand tons to obtain an additional twenty-five bushels per acre. Obviously, the law of diminishing returns is at work here; as cultivation becomes increasingly intensive, increasing amounts of nitrogen fertilizer must be used to obtain the same increment in yield. In these figures lies the crux of the issue that confronts Decatur. Local farmers often find that if they receive a return of only about eighty bushels per acre from their corn crop, they just about meet expenses. If they are to operate at a profit, the yield per acre must be raised above that point, and under present conditions this can be accomplished only by the use of nitrogen fertilizer at levels that are utilized very inefficiently by the crop.

The farmers are not troubled by this inefficiency in itself, because the cost of fertilizer is very low. Of course, the inefficient uptake of the last few pounds of nitrogen per acre means that a good deal of the nitrogen must go somewhere else. The fate of this "lost" nitrogen is suggested by data from the Illinois State Water Survey, which shows that between 1958 and 1965, when nitrogen-fertilizer use increased fourfold, the nitrate levels of a number of the rivers that drain Illinois farmlands increased significantly. There was good reason to believe that the intensive use of nitrogen fertilizer was the basic cause of the dangerously high levels of nitrate in the Decatur water supply. This possibility put the citizens of Decatur in a very difficult position. Clearly, there was a hazard to their water supply that needed to be corrected, but if it were to be corrected by a reduction in the use of nitrogen fertilizer on the surrounding farms, not only the farmers but Decatur itself would suffer economically, since the economy of the city was largely dependent on the farms.

Further controversy on this general subject broke out following my presentation of a paper on the relation between fertilizer and nitrate levels in Midwestern rivers at the annual meeting of the American Association for the Advancement of Science in December, 1968. Within two weeks, an official of the National Plant Food Institute, the American fertilizer trade association, had sent out letters to soil experts at a number of major universities warning them about my paper. This attitude is understandable, given the Institute's vested interest in increasing the sale of fertilizer—a two-billion-dollar industry in the United States. Even within the scientific community itself, "objectivity" is a difficult—perhaps an illusory—goal. After all, we in the scientific community are all human beings as well as scientists. Like everyone else, we develop a set of personal values that reflect, among other things our relations to major segments of society and our vested interest in the significance and validity of our own work. The way scientists get at the truth is not so much by avoiding mistakes or personal bias as by displaying them in public, where they can be corrected. In any event, it is not surprising that, in addition to the officers of the fertilizer trade association, some individual university scientists should have been irritated by observations regarding the hazards of fertilizers to water quality, for the farmers who now use great amounts of nitrogen fertilizer do so on the advice of agricultural scientists—men who have devoted their lives to improving the farmers' crop yield and their economic well-being. Indeed, the enormous economic value of nitrogen fertilizer to the farmers of the United States is a tribute to the personal devotion and competence of agricultural scientists. What is at fault in this situation is not the agricultural consequences of intensive nitrogen fertilization for farm yields but its ecological consequences for water supplies, and until very recently—when the controversy over pesticides, fertilizers, and other agricultural chemicals led to a change in outlook—this broader context was considered to lie outside the scope of agricultural science.

Aside from open discussion, the scientific community has another procedure for getting at the truth—the accumulation of more data. Accordingly, some of us at the Washington University Center for the Biology of Natural Systems decided to study the Decatur situation in detail. Excellent information about the nitrate levels of the Sangamon River was already available from the Illinois State Water Survey, and data regarding fertilizer use were also at hand. Though the parallel between the two sets of data was evident, such results would continue to be open to criticism as long as there was no information that literally traced the movement of fertilizer nitrogen from the point of application in the soil to the river itself. What was needed was some way to distinguish between the nitrate in the river which originated in artificial fertilizer and the nitrate which originated from the breakdown of humus or other organic materials. At this point, I recalled an observation made in my laboratory some twenty years earlier, when we were using a heavy (non-radioactive) isotope of nitrogen to trace the synthesis of viruses in plants. In nature, the nitrogen atom exists in two forms, which are chemically identical and differ only in their atomic weights. One of them, Nitrogen 14 (that is, nitrogen with a weight of fourteen atomic units), makes up about 99.6 per cent of all natural nitrogen; the other form, Nitrogen 15 (that is, nitrogen with a weight of fifteen atomic units), makes up the remainder. The ratio between the prevalence of the two forms of nitrogen can be determined with remarkable precision by an electronic instrument, the mass spectrometer. From mass-spectrometer measurements, we now soon learned that whereas the artificial fertilizers used in Illinois all had nitrogen-isotope ratios approximately the same as that found in the air (a natural consequence of the fact that they were made, chemically, from air nitrogen), natural nitrogen in soil, manure, and sewage was considerably enriched in Nitrogen 15. This meant that

measurements of the isotope ratio in nitrate taken from the Sangamon River or from soil-drainage water might show whether the nitrate was derived from artificial fertilizer or from organic matter in soil, manure, or sewage.

We decided to make such measurements. Fortunately, a Center associate, Dr. John W. Goers, had been brought up in Illinois and knew the Decatur area and some of its people well. He obtained the cooperation of a group of farmers whose land lay in the Sangamon River watershed near the town of Cerro Gordo. All the land in the area is artificially drained by a system of tile pipes that lie three or four feet beneath the surface. Tramping about the fields with his farmer friends, Dr. Goers located the outlet points of various drainage tiles and made arrangements to collect samples of the water that flowed from them. These samples were brought back to the laboratory and measured for nitrate content, and the nitrogen was analyzed with respect to the ratio between Nitrogen 15 and Nitrogen 14. It was found that those drains yielding high nitrate levels were low in Nitrogen 15 content, and those yielding low levels were high in it. This meant that whatever source was responsible for high nitrate levels in soil-drainage water must have itself been relatively low in Nitrogen 15 content. The only possible nitrogen source with that characteristic was artificial nitrogen fertilizer. More detailed studies confirmed this conclusion, and showed as well that a minimum of sixty per cent of the nitrate in Lake Decatur is derived from fertilizer used on the adjacent farms. There is now little doubt that the nitrate problem in Lake Decatur arises from the intensive use of artificial nitrogen fertilizer on the neighboring farms.

It should be noted that our university is not an agricultural institution—that, indeed, like most of the nation's independent universities, it has long been guided by the precept that its mission is the propagation of "pure" knowledge. This has been particularly true in the science departments, where the goal is the pursuit of "basic" science—the fundamental properties of nature. In practice, especially in biology, this has meant in recent years that research has been concerned largely with the finer details of chemical and physical progresses in living things. Usually, such events cannot be studied in whole living systems, where they are so numerous and so elaborately interconnected that the nature of any single process is obscured by the effects of others. Instead, research tends to be concentrated on test-tube systems of reactive molecules isolated from living things. This kind of research, "molecular biology," has become almost synonymous with "pure" biology. Some of us have been concerned because such an approach is inapplicable to the actual biological processes that occur in nature—for example, in Illinois soil—where the system's intrinsic complexity must be understood rather than avoided by artificial isolation of its parts in the laboratory. Indeed, a general controversy has now arisen in the United States scientific community—a controversy reflecting to some degree the demand by many of our students for studies that are relevant to the real problems of the world. The controversy centers on the question of whether "basic" science ought to be pursued for its own sake or whether equally basic research can be done in the complex arena of nature as it exists outside the laboratory. One of my university colleagues, Dr. Daniel H. Kohl, is an expert and gifted researcher into the electronic processes that couple the driving force of solar energy to the chemical changes that are the ultimate consequences of photosynthesis in plants. Dr. Kohl is concerned with more than electrons, however, and has an equally strong interest in the environmental crisis and its consequences for human welfare. He therefore expressed an interest in taking part in our study of the isotope analysis of the fate of fertilizer nitrogen in Illinois. Indeed, he is responsible for much of the recent success of the study, not only in the laboratory but in the equally important arena of ordinary human relations with Illinois farmers. It is disturbing but illuminating to record that Dr. Kohl's decision to undertake this work was made over the strong objection of most of his departmental colleagues, who were convinced that such work was an unacceptable diversion from the department's devotion to "pure" research.

Since then, much of the controversy has faded away, for it has become increasingly evident—not only to the Decatur health officials but also to farmers, agronomists, and "pure" biologists—that the fertilizer problem is serious and is of far-ranging scientific and social significance. This was apparent when we reported the results of our isotope studies at an unusual kind of scientific seminar, held one evening in the fall of 1970 in the Cerro Gordo high school with local farmers, local health-department officials, and agronomists from the University of Illinois. We presented our results, explained our interpretation of them, and reported our conclusion that the high nitrate levels in the Decatur water supply were due largely to the intensive use of nitrogen fertilizer by the surrounding farms. The discussion went on for hours. Following a lively interchange with the agronomists, there was general agreement that the data were meaningful. One agronomist reported that agricultural agents were already advising local farmers to start thinking about the possibility of using less nitrogen fertilizer. (Some months later, that same man, Samuel R. Aldrich, who is one of the nation's leading agricultural experts, was appointed to the Illinois Pollution Control Board, where he proposed a measure unprecedented in United States agriculture: state regulations to govern the use of fertilizer.) The response of the farmers that evening was especially rewarding. From their own scientific insights, they advanced useful suggestions for the further development of our research. Indeed, several farmers have since offered the use of their land for experimental studies to determine the effects of reduced fertilizer levels on the nitrogen output of drainage tiles. From that discussion in the high school at Cerro Gordo, it was evident that the farmers, who had the most to lose from any reduction of nitrogen use, were as deeply concerned as the health officials about the hazard to the Decatur water supply. They made it clear that they were prepared to consider any suggestions that might resolve the conflict between Decatur's need for healthful water and their own need to make a living.

Since then, our work has continued at a much more rapid pace. We have assembled a team of biologists, chemists, geologists, soil scientists, biochemists, anthropologists, and economists to work out the broad range of problems that must be considered. On the one hand, we are studying the incidence of methemoglobinemia in the area, in order to evaluate the potential cost, in health, of elevated nitrate levels. At the same time, detailed studies have been started to work out the consequences for the farmer of any proposed reduction in nitrogen-fertilizer use. Aside from our own group, other researchers have been working in the area, and one of these men, Dr. Abraham Gelperin, of the University of Illinois, recently reported the results of a ten-year study of infant death rates in various Illinois counties. He reported that in five counties the death rate from asphyxiation for all babies born during the months when nitrate levels were high (April, May, and June) was 4.8 per thousand. For the months when nitrate levels were low (August, September, and October), the rate for boy babies was 4.5 per thousand, while the rate for girls was only 2.9 per thousand. Dr. Gelperin concluded, "The evidence indicated that high levels of nitrate in the water, as found in these counties, may increase the infant mortality rate among female babies." This may be the first evidence of the cost in human health of the intensive use of nitrogen fertilizer.

What we learn in the cornfields around Decatur will be applicable elsewhere. In central California, intensive use of nitrogen fertilizer is suspected of causing sharp increases in nitrate levels in wells that yield the water supply for many towns. A similar problem has appeared in Israel and in Germany. All this reflects the unexpected result of an important technological advance that was permitted to intrude significantly on the environment before we were aware that in improving agriculture it would harm human health.

Environmental deterioration is caused by human action and has painful effects on the human condition. The environmental crisis is therefore not only an ecological problem but also a social one. To the intrinsic complexity of the ecosphere this circumstance adds the further complications of human activities. The number of people supported by the earth's natural system; the sciences that tell us what we know about nature; the technology that converts this knowledge into practical action; the resultant industrial and agricultural production that extracts new wealth from the earth's skin; the economic systems that govern the distribution and uses of wealth; the social, cultural, and political processes that shape all the rest—where in this welter of circumstances can we find the human activities that have been most significant in causing the environmental crisis? Those who are concerned with "overpopulation" often confront us with figures on the galloping progression of the number of human beings who inhabit the earth: five million in prehistoric times, two hundred and fifty million at the birth of Christ, five hundred million in 1650, one billion in 1850, three and a half billion at present, and some six billion projected for 2000. It must also be taken into account that there has been a similarly rapid growth in the number, variety, and usefulness of machines, buildings, conveyances, and cooking utensils; in the number, variety, and intellectual richness of literary works, paintings, musical compositions, and scientific articles. The earth has experienced not only a "population explosion" but also a "civilization explosion"—the new knowledge of nature generated by science, the power of technology to guide natural forces, the huge increase in material wealth, the rich elaboration of economic, cultural, social, and political processes. In arbitrarily singling out from among all these human activities only one—science—my intention is not to slight such other important influences on man's attitude toward the world in which he lives as painting, music, and poetry, or to deny their power, but only to provide a sharper focus on the material base of human life on the earth. Science is, after all, the means by which human beings learn the nature of the world in which they live. Particularly in relation to the ecosphere, much of what we do is now guided, consciously, by what science tells us (or what we think it tells us) about nature.

Immediately dependent on science—the accumulated knowledge of how nature operates—is technology, which generates practical means of using scientific knowledge for useful ends. In the past, technology was often developed by trial and error, rather than directly from organized scientific knowledge, but in modern times nearly all technological advances have been consciously guided by science. In turn—and, again, especially in modern times—industrial and agricultural production are dependent on technology. And in all modern societies

production is closely linked to the operation of the economic systems that govern the distribution and exchange of the forms of wealth people require. (To be sure, the connection between science and technology, on the one hand, and the economic system, on the other, is a two-way affair. While economic activity depends on productive processes generated by science and technology, the reverse is also true. The economic system—and the political ideology it expresses—imposes important constraints on the development of science and technology. One of these is simply money, which is provided by government agencies, private foundations, or business enterprises to support research and development. Those who provide this support can, and do, influence the course of science and technology simply by choosing the areas they favor. Science and technology are thus subject to considerable social direction.)

Let us consider the effects of extracting wealth from the ecosystem, which, together with the earth's mineral resources, is the source of all the goods produced by human labor. As wealth increases, so does the number of people it supports—for there is considerable evidence that increased wealth reduces mortality, which (if the birth rate does not also decline) leads to an increase in population. Since human beings are self-propagated, there is a built-in tendency for the population to grow as long as sufficient wealth is available to support the newly added people. In turn, the increasing numbers of people tend to intensify all the activities that depend on people—science, technology, production, and the creation of wealth. It is sometimes supposed that this self-accelerating interaction between the increase in wealth and the increase in technological competence is bound to set off an explosive "population bomb" unless deliberate steps are taken to control the birth rate. Actually, there is strong evidence that the process itself sets up a counterforce, which slows population growth considerably. This process, known as the "demographic transition" has occurred in most of the industrialized nations of the world. At first, in the early stages of the eighteenth-century agricultural and industrial revolution, increasing wealth reduced mortality, so that—with birth rates unchanged—populations grew rapidly. Later, with a further improvement in living standards, in the nineteenth century, birth rates declined and population growth slowed down. The reasons for this change are not biological but social. Especially important is the changing role of children. When living standards were relatively low—for example, in the early stages of the industrial revolution—the labor of children was essential to the family's survival. Later, with improved living standards, adult labor became sufficient to maintain family income; compulsory schools were established, and the children, instead of being economic assets, became economic liabilities. At the same time, as social services improved, parents were less likely to depend on children as a form of old-age insurance. The natural result was a reduced birth rate, which occurred even without the benefit of modern methods of contraception. Thus, although population growth is an inherent feature of the progressive development of productive activities, it tends to be limited by the same force that stimulates it—the accumulation of social wealth and resources.

A kind of self-propagating tendency can also be recognized within the areas of science and technology, which represent an accumulating, evolving assemblage of facts, ideas, and attitudes that are perpetuated by being recorded. The body of scientific literature and the practical, lasting evidence of technological achievements become starting points for further advances. In this sense, science and technology, like the population, are self-generating and, at least for the present, are growing at an ever-increasing rate. The scientific "information explosion" is exemplified in the growth curve of scientific papers; the number is doubling every fifteen years. Technology, as exemplified by the proliferation of new instruments and techniques generated by a germinal invention (for example, the transistor), also grows at an accelerating rate. Thus, science and technology tend to generate their own growth as long as the social factors on which they depend permit.

Self-generated growth is characteristic of industrial and agricultural production as well. Particularly in modern industrial systems, production leads to the accumulation of capital goods and financial resources, and therefore to the further expansion of production and of its wealth-creating capacity. All modern economic systems are designed to grow by means of such self-generated expansion. Clearly, these sectors of the system constitute another self-driven force that tends to expand the size of the over-all cycle of production and human activity on the earth.

All these expanding activities in the cycle of man in nature are dependent on the only part of the over-all system that is not created by human effort. The ecosphere existed before human beings did on the earth; its fundamental properties were established long before the appearance of man. And, in contrast to the human sectors of the system, this natural segment is intrinsically incapable of continued growth or expansion. The ecosphere and its mineral resources are fixed in mass. The solar radiation that drives the dynamic events in the ecosphere is, on the time scale of human life, fixed in amount. (It is gradually declining with the extinction of the sun over a period of many billion years.) Moreover, the ecosphere is governed by cyclical processes that must operate in a state of balance. It is a fundamental fact of nature, then, that the base of human existence represented by the ecosphere and its mineral resources is limited in its size and its rate of activity. One can argue about whether the ecosphere has ever operated, either in its prehuman, natural condition or in its present one, near its intrinsic limit, but that there is some limit—that the system's operation does not permit indefinitely continued growth—is undeniable.

Kept in proper balance, the earth's ecological cycle is self-renewable, at least over the time scale involved in human history. On this time scale, it can operate and support some number of human beings as one of its constituents more or less indefinitely. However, mineral resources that are used can move in only one direction—downward in amount. Unlike the other constituents of the ecosphere, mineral resources are nonrenewable. Fossil fuels, such as coal, oil, and natural gas, were deposited in the earth during a special period of its evolution, which has not been repeated since (except for the slow accumulation of very slight modern fuel deposits, such as peat). Once fossil fuels are used, the solar energy trapped within them millions of years ago is dissipated and lost irrevocably. The earth's store of metals was also laid down by not-to-be-repeated geological events, and this is also non-renewable. Of course, since matter is never destroyed, metals taken from the earth's ores remain on the earth after use and, in theory, could be used again. However, when iron, for example, is taken from the earth as a concentrated ore and is converted into products that are later scattered, as rust, across the face of the globe, what is lost, irrevocably, is energy. Whenever any material is scattered from a concentrated origin and mingles with other substances, there is an increase in the property known as entropy, which involves a loss in available energy. This is perhaps more easily seen in reverse—as the fact that the gathering together of scattered material into an ordered arrangement requires the addition of energy. (Anyone who has tried to reassemble a jigsaw puzzle from its scattered parts has experienced this law of nature.) Since any use of a metallic resource inevitably involves some scattering of the material, if only from the effects of friction, the availability of the resource declines constantly and can be reversed only at the expense of added energy, which is itself a limited resource. There is nothing inevitable about the high rate at which most metallic resources are now scattered after use and so lost to reuse. If we wished, we could recover nearly all the copper produced from ore and built into products and use it again when the products have outlived their usefulness. All that would be required would be to place sufficiently high value on the metal. This is exactly what has been done with gold, silver, and platinum—the precious metals. As a result, only a small proportion of all of the precious metals ever mined has been lost to reuse. If all metals were valued as highly as gold, the problem of mineral depletion would be solved for a very long time. Depletion of metal is governed not so much by the amount of metal that is used as by the value placed on it, which determine its degree of reuse.

We come, then, to a fundamental paradox of man's life on the earth; that human civilization involves a sequence of cyclically interdependent processes that have a built-in tendency to grow, except one—the natural, irreplaceable, absolutely essential resources represented by the earth's ecosphere. A clash between the propensity of the man-dependent sectors of the cycle to grow and the intractable limits of the natural sector of the cycle is inevitable. Clearly, if human activity on the earth—civilization—is to survive, it must accommodate itself to the demands of the natural sector, the ecosphere. The present environmental deterioration is a signal that we have failed thus far to achieve this essential accommodation. So much is evident from what we now know about enviromental pollution. The fouling of surface waters is the result of our overloading of the natural, limited cycle of the aquatic ecosystem either directly, by the dumping of organic matter, in the form of sewage and industrial wastes, or indirectly, by the release of algal nutrients produced by waste treatment or leached from overfertilized soil. The pollution of water is a signal that its limited, natural self-purifying cycle has broken down under stress. Similarly, air pollution is a signal that human activities have overloaded the self-cleansing capacity of the weather system—that the natural winds, rain, and snow are no longer capable of cleaning the air. The deterioration of the soil is a signal that another system has been overdriven—that organic matter, in the form of food, is being extracted from the soil at a rate that exceeds the rate of rebuilding of the soil's humus. The technical expedient of attempting to evade this problem by loading the soil with inorganic fertilizer is capable of restoring the crop yield, but at the expense of increasing pollution. All three ecosystems have been polluted by man-made synthetics such as pesticides, detergents, and plastics, and by the dissemination of materials not naturally part of the environment, such as lead and artificial radioactive substances; these materials cannot be accommodated by the self-purifying abilities of the natural systems, and therefore accumulate in places harmful to the ecosystems and to man. And environmental pollution by a metal such as mercury—and the depletion of this mineral resource—is a consequence only of our willingness to "lose" it because it is insufficiently valuable, according to present economic criteria, to be reclaimed. In sum, there is something gravely wrong with the way man uses the natural resources available to him on the earth.

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A REPORTER AT LARGE: THE CLOSING CIRCLE—PART II

There is something seriously wrong with the way human beings have occupied their habitat, the earth. The fault must lie not with nature but with man, for no one has argued, to my knowledge, that the recent advent of pollutants on the earth is the result of some natural change, independent of man. Indeed, the few remaining areas of the world that are relatively untouched by the powerful hand of man are to that degree free of smog, foul water, and deteriorating soil. One explanation that is sometimes offered is that man is a "dirty" animal—that, unlike other animals, man is likely to "foul his own nest." Somehow, according to this view, people lack other animals' tidy nature, and increasingly foul the world as their numbers increase. This explanation is basically faulty, for in a natural ecological cycle no waste can accumulate, because nothing is wasted. Thus, a living thing that is a natural part of an ecosystem cannot by its own biological activities degrade that ecosystem; it is always from without that an ecosystem is subjected to stress. Human beings, as animals, are no less tidy than other living organisms. They pollute the environment only because they have broken out of the closed network of the environmental cycle in which all other living things are held. As long as human beings held their place in the terrestrial ecosystem—consuming food produced by the soil and oxygen released by plants, returning organic wastes to the soil and carbon dioxide to the plants—they could do no serious ecological harm. However, once removed from this cycle—for example, to a city—so that bodily wastes are not returned to the soil but released into surface water, the human population is separated from the ecosystem of which it was originally a part. Now the wastes become external to the aquatic system on which they intrude, overwhelm the system's self-adjustment, and pollute it.

Certain human activities—for example, agriculture, forestry, and fishing—directly exploit the productivity of a particular ecosystem. In these cases, a constituent of the ecosystem that has economic value—an agricultural crop, timber, or fish—is withdrawn from the ecosystem. This represents an external drain that must be carefully adjusted to natural and man-made inputs to the ecosystem if collapse is to be avoided. A heavy drain may drive the system out of balance toward collapse. Examples include the destructive erosion of agricultural or forest lands following overintense exploitation, and the incipient extinction of whales. Environmental stress may also arise if the amount of a particular component of the ecosystem is deliberately augmented from without, whether by the disposal of human waste, as in the dumping of sewage into surface waters, or in an effort to accelerate the system's rate of turnover and thereby increase the yield of an extractable good, as in the use of nitrogen fertilizer in agriculture. Finally, since human beings are uniquely capable of producing materials not found in nature, environmental degradation may be due to the intrusion into an ecosystem of a substance wholly foreign to it. Perhaps the simplest example is a synthetic such as plastic, which, unlike natural materials, is not degradable by biological decay, and therefore persists as rubbish or is burned—in either case causing pollution. In the same way, a toxic substance such as DDT or lead, which does not play any natural role in the chemistry of life and interferes with the actions of substances that do, is bound to cause ecological damage wherever it is sufficiently concentrated. In general, any productive activity that introduces substances foreign to the natural environment runs a considerable risk of polluting it. It becomes necessary, then, to discover why human activities generate environmental impacts—that is, external intrusions into the ecosystem which tend to diminish its natural capacity for self-adjustment.

As a first step, we might look at the history of the pollution problem in a highly industrialized country like the United States. Unfortunately, despite the national proclivity for collecting and storing in the memories of the ubiquitous computers all sorts of statistics, from an individual's tax returns to the record of his attendance at political rallies, historical data on pollution levels are very spotty. However, a rather striking picture emerges from the data that are available: most pollution problems made their first appearance, or became very much worse, in the years following the Second World War.

A good example of this trend is provided by phosphate, an important pollutant of surface waters. In the thirty-year period from 1910 to 1940, the annual phosphate output from municipal sewage more than doubled, from about seventeen million pounds (calculated as phosphorus) to about forty million pounds. However, in the next thirty-year period, from 1940 to 1970, it increased more than sevenfold, to about three hundred million pounds a year. Since 1946, there have been these other significant increases in annual pollutant outputs: nitrogen oxides (which are released from automobile exhaust, and which trigger the formation of smog), 630 per cent; tetraethyl lead (from gasoline), 415 per cent; mercury (from chlorinealkali factories), 2,100 per cent; synthetic pesticides (between 1950 and 1967 only), 270 per cent; inorganic nitrogen fertilizer (some of which leaches into surface water), 789 per cent; non-returnable beer bottles, 595 per cent. Many pollutants were totally absent before the Second World War, having made their environmental débuts during or just following the war years: photochemical smog first became a matter of public concern in Los Angeles in 1942 and 1943; man-made radioactive elements were first produced in significant quantity in the wartime atomic-bomb project; DDT was widely used for the first time in 1944; synthetic detergents began to displace soap in the nineteen-forties; plastics became a contributor to the rubbish problem only after the war.

These striking changes in the pace of environmental deterioration provide an important clue to the origin of the pollution problem. The last fifty years have seen a sweeping revolution in science, which has generated powerful changes in technology and in the application of technology to industry, agriculture, transportation, and communication. The Second World War marked the turning point. The twenty-five years preceding the war were the main period of the modern scientific revolution in basic science, especially in physics and chemistry, upon which so much of the new productive technology is based. In the period of the war itself, under the pressure of military demands, much of the new scientific knowledge was rapidly converted into new technologies and productive enterprises. Since the war, the new technologies have rapidly transformed the nature of industrial and agricultural production.

The development of postwar technology had its origins in the basic nature of the prewar scientific revolution. In the nineteen-twenties, physics broke away from the ideas that had dominated the field since Newton's time. Spurred by discoveries about the properties of atoms, a wholly new conception of the nature of matter was formulated. Experiment and theory advanced until physicists gained a remarkably effective understanding of the properties of subatomic particles and of the ways in which they interact to generate the properties of the atom. This new knowledge produced powerful techniques for smashing the heretofore indestructible atom, driving out of its nucleus extremely energetic particles. Artificial radioactivity was discovered. By the late nineteen-thirties, it had become clear, on theoretical grounds, that vast quantities of energy could be released from the atomic nucleus. During the Second World War, this theory was converted into practice, giving rise to nuclear weapons and nuclear reactors—and to the hazards of artificial radioactivity, including the potential for catastrophic war. The new physical theories also helped to explain the behavior of electrons, especially in solids—knowledge that led, in the post-war years, to the invention of the transistor and the proliferation of solid-state electronic components. This provided the technological base for the modern computer, not to speak of the transistor radio.

Chemistry, too, had made remarkable progress in the prewar period. Particularly significant for later alterations in the environment were advances in the chemistry of organic compounds. These substances were first discovered by eighteenth-century chemists in the juices of living things. Gradually, chemists learned the molecular composition of some of the simpler varieties of these natural organic substances and developed a powerful desire to imitate nature—to synthesize organic substances in the laboratory. The first man-made organic substance, urea, was synthesized in 1828. From this simple beginning (urea contains only one carbon atom), chemists learned how to make laboratory replicas of increasingly complex natural products.

Once techniques for putting organic molecules together were worked out, an enormous variety of substances could be made. For example, although the molecules classed as sugars contain only three types of atoms—carbon, oxygen, and hydrogen—and these three can be related to each other in only a few different ways, there are sixteen different molecular arrangements for just those sugars which contain six carbon atoms. (One of these arrangements produces the familiar glucose.) The number of different kinds of organic molecules that can, in theory, exist is so large as to have no meaningful limit. Around 1900, chemists learned practical ways of creating many of the theoretically possible molecular arrangements. The knowledge that the variety of possible organic compounds is essentially limitless and that ways of achieving at least some of the possible combinations were at hand proved irresistible. The result represents, in terms of the number of new man-made objects, probably the most rapid burst of creativity in human history. Acceleration was built into the process, for each newly created molecule became the starting point for building many other new ones. Consequently, there accumulated on the chemists' shelves a huge array of new substances, similar to the natural materials of life in that they were based on the chemistry of carbon, but absent from the realm of living things. Some of the chemicals were taken off the shelf—either because of a resemblance to some natural substance or at random—and tried out in practical uses. This is how it was found in 1935 that sulfanilamide, which a dyestuff chemist had synthesized in 1908, could kill bacteria, and how it was found in 1939 that DDT, which had sat on a shelf in a chemical laboratory since 1874, could kill insects. During this period, a good deal was learned about the chemical basis of important molecular properties—the kind of molecular structure that governs a substance's color, elasticity, fibrous strength, and ability to kill bacteria, insects, or weeds. It then became possible to design new molecules for a particular purpose rather than search the chemical storeroom for likely candidates.

Thus, the prewar scientific revolution produced, in modern physics and chemistry,

sciences capable of manipulating nature—of creating, for the first time on earth, wholly new forms of matter. But until the Second World War the practical consequences were slight, compared to the size and richness of the accumulated store of knowledge. What the physicists had learned about atomic structure appeared outside the laboratory only in a few kinds of electrical equipment, such as certain lamps and X-ray apparatus. In industry, the technological use of physical phenomena was still largely restricted to mechanical motion, electricity, heat, and light. In the same way, the chemical industry was based largely on familiar substances—minerals and other inorganic chemicals. But the new tools, unprecedented in their power, were there, awaiting only the urgency of wartime needs and the stimulus of postwar reconstruction to be put to work. Not until later was the potentially fatal flaw in the scientific foundation of the new technology discovered. This technology was like a two-legged stool: well founded in physics and chemistry but missing its essential third leg—the biology of the environment.

In addition to the great outburst of technological innovation, there have been significant social and economic changes in the United States since the Second World War. Are these, too, related to the pollution problem? Pollution is often blamed, for example, on a rising population and a rising level of affluence. It is easy to demonstrate that the changes in pollution levels in the United States since the Second World War cannot be accounted for simply by the increased population, which in that period rose by forty-odd percent. Of course, this is a simplistic response to a simplistic proposal. It is conceivable that even a forty- or fifty-percent increase in population might be the cause of a much larger increase in pollution intensities—which can be shown to lie in the range of from two hundred to two thousand percent. It might be that providing food, clothing, and shelter necessary for the increased population would require intensified production by inefficient facilities. (For example, obsolete factories might need to be pressed into use.) In this case, a disproportionate increase in pollution would result from the operation of the inefficient production facilities, and, furthermore, the production facilities would need to expand much more than forty or fifty percent to meet the needs of the increased population. This would imply a reduction in productivity (that is, the value produced per unit of labor expended). In actuality, matters are just the other way around; there have been sharp increases in productivity since 1946. Moreover, the chemical industries, which are particularly heavy polluters, have shown especially large increases in productivity; between 1958 and 1968, productivity in the chemical industries increased by seventy-three percent, compared to a thirty-nine percent increase for all manufacturing. So there is no evidence of a decrease in productive efficiency that might account for the discrepancy between recent increases in pollution levels and the growth of the population.

Another popular idea is that the increase in population has led to the rapid growth of cities, where internal crowding and deteriorating social conditions cause a worsening of the pollution problem. This notion, too, fails to account for the actual intensity of the environmental crisis. For one thing, a number of serious pollution problems, such as those created by radioactive fallout, fertilizer, pesticides, and mercury, are not of urban origin. It is true, however, that the size and population density of a city will have a disproportionately large effect on pollution levels, because of the "edge" effect; that is, as a city becomes larger, the length of its circumference relative to its area becomes smaller, and since wastes must be removed at the city's boundaries, waste levels can be expected to rise in terms of the effort to remove them per unit area. This effect may explain differences that exist among cities of different sizes in the incidence of diseases related to air pollution. Thus, the per-capita incidence of lung cancr in the largest cities—cities with a population of one million or more—is about thirty-seven per cent higher than that in cities with a population ranging from two hundred and fifty thousand to one million population. The distribution of population clearly does have a serious effect on environmental pollution resulting from automotive transport. Consider, for example, the consequences of the population shifts that are typical of United States cities; namely, the rising population of blacks and other minority groups in urban ghettos, and the migration of more affluent social groups to the suburbs. These processes separate the homes and the places of work of both ghetto dwellers and suburbanites. The relatively affluent who work in the city but are unwilling to live there need to commute; ghetto dwellers who have found work in outlying industries but are unable to live in the suburbs must commute in reverse. Partly as a result, the per-capita figure for automobile vehicle-miles travelled within metropolitan areas increased from 1,050 in 1946 to 1,790 in 1966. The significant point, however, is that the intensification of environmental problems associated with urbanization is due not so much to the increasing size of the population as to the maldistribution of the living and working places in metropolitan areas.

Indeed, there appears to be no way to account for the rapid growth in pollution levels in the United States since 1946 by the concurrent growth in the over-all population. Neither simple increase in numbers nor the multiplicative effects of urban crowding nor a supposed decrease in productive efficiency can explain the sharp increases in pollution that are the mark of the environmental crisis. For the fact is that the ratio between the amount of pollution generated in the United States and the size of the population has increased greatly since 1946. This relationship can be converted to the mathematically equivalent—but highly misleading—statement: There has been a sharp increase per person in the amount of pollution produced. Since the biological wastes produced per person have certainly not increased, this statement might lead one to conclude that each of us has become more affluent and therefore responsible for the use of more goods and for the production of more wastes. A statistic that is sometimes introduced to bolster this conclusion is that the United States contains about six per cent of the world's population but uses from forty to fifty per cent of the world's goods, and that this kind of affluent society is in the nature of things also an "effluent society."

Again, it is useful to look at the facts about "affluence" in the United States. We can think of affluence in terms of the average amount of goods devoted, per person, to individual welfare. As a very rough measure—as we shall see, it is vastly inflated—we might use the gross national product available per person. In the twenty-year period from 1946 to 1966, the G.N.P. per capita (expressed in 1958 dollars, to correct for inflation) went up from $2,222 to $3,354. This represents an increase of about fifty percent, which by itself is insufficient to account for the observed increases in pollution per capita.

Since the G.N.P. is a crude over-all estimate of the goods and services produced in the country, it is more informative to break it down into specific items, and especially to distinguish between those essential to life—food, clothing, and shelter—and such amenities as personal automobiles, television sets, and electric corn poppers. With respect to food, the over-all picture for the 1946–66 period is quite clear: No significant changes took place in the per-capita availability of the major food categories, such as total calories and total protein, in the United States. The total calories available actually declined somewhat, from about 3,320 per person per day in 1946 to about 3,170 per person per day in 1966. The total protein available dropped slightly in the late forties, remained constant at about ninety-five grams per person per day until 1963, and then began to rise slightly, reaching the value of ninety-seven grams per person per day in 1966. These figures are reflected in over-all agricultural-production data for the United States. In the postwar period, total production per capita of grain and meat have not varied from year to year by more than a few per cent. In the same period, per-capita consumption of certain important diet components—calcium, Vitamins A and C, and thiamine—declined between six and twenty per cent. This situation may reflect a temporary improvement in nutritional balance effected by war-time food programs and an unfortunate decline in the quality of the United States diet when these programs were abandoned. Over all, it is clear that, in total quantity per capita, food consumption in the United States remained essentially unchanged from 1946 to 1966, although there was some decline in certain aspects of diet quality. There is no sign of increasing affluence with respect to food consumption.

When it comes to clothing, the situation is quite similar. There was essentially no change in per-capita production. For example, the annual production of shoes per person in the United States remained constant, at about three pairs, between 1946 and 1966. The per-capita domestic production of all types of hosiery in that period was more variable, but there was no significant over-all change between 1946 and 1966. While rapidly changing styles in those twenty years caused large variations in the proportion of different types of clothing used per capita (for example, the production of men's and women's suits declined considerably, and the production of separate skirts, blouses, trousers, and sports shirts increased), the over-all per-capita production of clothing remained essentially the same. The total fibre used per capita in 1950 was forty-five pounds, and in 1968 it was forty-nine pounds—an increase of only nine per cent. Again we must conclude that, at least in the crude terms of the amount of clothing produced per capita, there is no sign of increasing affluence in the United States in the period following the war.

With respect to shelter, housing units occupied in 1946 were .272 per capita, and in 1966 they were .295 per capita. These figures do not take into account the quality of housing, but, in any case, they do not indicate any marked increase in affluence with respect to housing. This situation is also reflected in the production figures for housing materials, which show little change per capita in the period following 1946.

In sum, the per-capita production of goods to meet major human needs—food, clothing, and shelter—did not increase significantly in the period between 1946 and 1966, and has actually declined in some respects. There was an increase in the per-capita utilization of electric power, fuels, and paper products, but these changes cannot fully account for the striking rise in pollution levels. If affluence is measured in terms of household amenities such as television sets, radios, and electric can openers and corn poppers and in terms of leisure items such as snowmobiles and boats, then there have been striking increases. But, again, these items are simply too small a part of the nation's over-all production to account for the observed increase in pollution levels. What these figures tell us is that, in the most general terms, United

States production—apart from certain items mentioned above—has about kept pace with United States population growth in the period between 1946 and 1966. This means that the over-all production of basic items, such as food, steel, and fabrics, has by and large increased in proportion to the rise in population. This over-all increase in total United States production falls far short of the concurrent rise in pollution levels. It seems clear, then, that despite the frequent assertions that the cause of the environmental crisis is overpopulation or affluence, or both, we must seek elsewhere for an explanation.

Exploitation of the ecosystem is what generates economic growth, but the rate of the exploitation cannot increase indefinitely without overdriving the system and pushing it to the point of collapse. To be sure, this does not mean that any increase in economic activity automatically produces more pollution. What happens to the environment depends on how the growth is achieved. During the nineteenth century, the nation's economic growth was sustained in part by rapacious lumbering, which denuded whole hillsides and eroded the soil. On the other hand, the economic growth that began to lift the United States out of the economic depression in the nineteen-thirties was enhanced by an ecologically sound measure, the soil-conservation program. This program contributed to economic growth by helping to restore the fertility of the depleted soil. Such ecologically sound economic growth not only avoids environmental deterioration but can actually reverse it. For example, improved conservation of pasturelands, which has been economically beneficial in the western part of the Missouri River drainage basin, seems to have reduced the level of nitrate pollution in that stretch of the river. By contrast, farther downstream, in Nebraska, agricultural growth has been achieved by an intensification of the use of fertilizer, which leads to serious problems of nitrate pollution. In other words, the fact that the economy has grown—that the G.N.P. has increased—tells us very little about the possible environmental consequences. For that, we need to know *how* the economy has grown.

The growth of the United States economy is recorded in elaborate detail in a variety of government statistics—huge volumes that tabulate the amounts of various goods produced annually, the expenditures involved, the value of the goods sold, and so forth. Although these endless columns of figures are rather intimidating, they can be useful in comparing one kind of economic activity with another. Not long ago, with two colleagues, I went through the statistical tables and selected from them the data for several hundred items that together are both a major and a representative part of this country's over-all agricultural and industrial production. We then committed the numbers to an appropriately programmed computer. For each item, the average annual percentage of change in production or in consumption was compared for the years since 1946, or since the earliest date after that for which the statistics were available. Then we computed the over-all change for the entire twenty-five-year period—a twenty-five-year growth rate. This list, arranged in decreasing order of growth rate, presents a striking picture of how the American economy has grown since the Second World War.

The winner of this economic sweepstakes, with the highest postwar growth rate, is the production of non-returnable soda bottles, which has increased about 53,000 per cent in the past twenty-five years. The runners-up are an interesting but seemingly mixed bag. In second place is the production of synthetic fibres, up 5,980 per cent, and in third place is mercury used for chlorine production, up 3,930 per cent. Succeeding places are held as follows: mercury used in mildew-resistant paint, up 3,120 per cent; air-conditioner compressor units, up 2,850 per cent; plastics and resins, up 1,960 per cent; nitrogen fertilizer, up 1,050 per cent; electric housewares (such as can openers and corn poppers), up 1,040 per cent; synthetic organic chemical commodities, up 950 per cent; aluminum, up 680 per cent; chlorine gas, up 600 per cent; electric power, up 530 per cent; pesticides, up 390 per cent; wood pulp, up 313 per cent; truck freight, up 222 per cent; consumer electronics (TV sets, tape recorders, and the like), up 217 per cent; motor-fuel consumption, up 190 per cent; cement, up 150 per cent. Then comes a group of productive activities that, as I indicated earlier, have grown at about the pace of the population: food production; the total production of textiles and clothes; household utilities; and steel, copper, and other basic metals. Finally, there are the losers—economic activities that have increased more slowly than the population, or have actually shrunk. These start off with railroad freight, up only 17 per cent, and continue with lumber, down 1 per cent; cotton fibre, down 7 per cent; returnable beer bottles, down 36 per cent; wool, down 42 per cent; and soap, down 76 per cent. At the end of the line comes the horse—work-animal horsepower is down 87 per cent.

What emerges from all these data is striking evidence that while over-all production for most basic needs—food, clothing, housing—has kept up with the increase in population (that is, production per capita has been essentially constant), the kinds of goods produced to meet these needs have changed drastically. Of course, part of the economic growth in the United States since 1946 has been based on newly introduced goods—television sets, tape recorders, and snowmobiles, for example—which have increased absolutely, without displacing older products. But, in general, what has happened is that old production technologies have been displaced by new ones. Soap has been displaced by synthetic detergents; natural fibres—cotton and wool—have been displaced by synthetic ones; steel and lumber have been displaced by aluminum, plastics, and concrete; railroad freight has been displaced by truck freight; returnable bottles have been displaced by non-returnable ones. On the road, the low-powered automobile engines of the twenties and thirties have been displaced by high-powered ones. On the farm, where per-capita production has remained about constant, the amount of harvested acreage has decreased; in effect, fertilizer has displaced land. Older methods of insect control have been displaced by synthetic insecticides, such as DDT; for controlling weeds, the cultivator has been displaced by the herbicide spray. Range feeding of livestock has been displaced by feedlots. In each of these cases, what has changed drastically is the technology of production rather than over-all output of the economic goods.

That statistical fiction "the average American" now consumes each year about as much protein and other foods, for about as many calories (but with somewhat less vitamin content), uses about the same amount of clothes and cleaning agents, occupies about the same amount of housing, requires about as much freight, and drinks about the same amount of beer (twenty-six and a half gallons per capita) as he did in 1946. However, his food is now grown on less land with much more fertilizer and pesticides than before; his clothes are more likely to be made of synthetic fibres than of cotton or wool; he washes with synthetic detergents rather than soap; he lives and works in buildings that depend more heavily on aluminum, concrete, and plastic than on steel and lumber; the goods he uses are increasingly shipped by truck rather than by rail; he drinks beer out of nonreturnable bottles or cans rather than out of returnable bottles or at the tavern bar. He is more likely to live and work in air-conditioned surroundings than before. He also drives about twice as much as he did in 1946, in a heavier car, on synthetic rather than natural rubber tires, using more gasoline per mile, containing more tetraethyl lead, fed into an engine of increased horsepower and compression ratio.

All this reminds us of something we have already been told by advertising (which, incidentally, has also grown, with the use of newsprint for advertising growing faster than its use for news)—that we are blessed with an economy based on very modern technologies. Something the advertisements do not tell us—as we are urged to buy detergents synthetic shirts, aluminum furniture, and Detroit's latest creation—is that all this "progress" has greatly increased man's impact on his environment.

To most people, the "new technology" connotes computers, automation, nuclear power, and space exploration; these technologies are often blamed for the discordant problems of our technological age. In comparison, the farm, closer to nature, seems a place of innocence and simplicity. Yet some of the most serious environmental failures can be traced to technological developments on the American farm. Before it was transformed by modern technology, the farm was no more than a place where, to serve the convenience of man, several natural biological activities were localized: the growth of plants in the soil and the nurture of animals on the crops. Plants and animals were nourished, grew, and reproduced by means long established in nature. Their interrelationships were equally natural: the crops withdrew nutrients, like inorganic nitrogen, from the soil; the nutrients were derived by gradual bacterial action from the store of organic matter in the soil; the organic store was maintained by the return of plant debris and animal wastes to the soil and by the fixation of nitrogen from the air into useful organic forms. When these circumstances prevail, the ecological cycles are nearly in balance, and with a little care the natural fertility of soil can be maintained for centuries—as it has been, for example, in European countries and in many parts of the Orient. Particularly important is the retention of animal manure in the soil and the similar utilization of vegetable matter—including the garbage generated in the cities by the food produced on the farm. Almost every knowledgeable European observer who has visited the United States has been shocked by our carefree attitude toward soil husbandry. Not surprisingly, the American farmer has been engaged in a constant struggle to survive economically. In the great Depression of the nineteen-thirties, some of the severest hardships were endured by farmers, as the soil was first degraded by poor husbandry and then literally lost to the winds and rivers through the resultant erosion. In the postwar period, new agricultural technology came to the rescue. This new technology has been so successful—measured in the hard currency of the farmer's economic return—that it has become enshrined in a kind of farm management that is so far removed from the ancient plan of farming as to merit a wholly new name: "agribusiness."

Agribusiness is founded on several technological developments, chiefly in farm machinery, genetically controlled plant varieties, feedlots, inorganic fertilizers (especially nitrogen, and synthetic pesticides. But much of the new technology has been an ecological disaster; agribusiness is a main contributor to the environmental crisis. For example, consider feedlots—where cattle, removed from pasture, are crowded together to be fattened for market. Since the animals are confined, their wastes are heavily deposited in one small area. The natural rate of conversion of organic waste to humus is limited, so in a feedlot most of the nitrogenous waste

is converted to soluble forms (ammonia and nitrate). This material is rapidly evaporated or leached into ground water beneath the soil, or may run directly into surface waters during rainstorms. This is responsible, in part, for the appearance of high nitrate levels in some rural wells supplied by ground water, and for serious pollution problems resulting from the runaway growth of algae in a number of streams in the Midwest. Where untreated feedlot manure is allowed to reach surface water, it imposes a heavy oxygen demand on streams that may be already overloaded with municipal wastes. A livestock animal produces much more waste than a human being, and much of this waste is now confined to feedlots. For example, in 1966 more than ten million cattle were maintained in feedlots before slaughter—an increase of sixty-six per cent over the preceding eight years. Feedlots now produce more organic waste than the total sewage from all our municipalities. Thus, our sewage-disposal problem is more than twice its usually estimated size. The physical separation of livestock from the soil is related to an even more complex chain of events, which again leads to severe ecological problems. Animals confined in feedlots are supplied with grain rather than pasturage. When the soil is used for intensive grain production rather than pasturage—as it has been in much of the Midwest—the humus content is depleted; farmers then resort to increasingly heavy applications of inorganic fertilizer, especially of nitrogen, setting off an ecological sequence that is drastically disruptive.

At this point, fertilizer salesmen—and some agronomists—might counter with the argument that feedlots and the intensive use of fertilizer have been essential in increasing food production to keep pace with the rising population of the United States and the world. The actual statistics on this matter are worth some attention. Between 1949 and 1968, total agricultural production in the United States increased by about forty-five per cent. Since the United States population grew by thirty-four per cent in that period, the over-all increase in production was just about enough to keep pace with the population growth; crop production per capita increased by only six per cent. In the same period, the annual use of nitrogen fertilizer increased by six hundred and forty-eight per cent—an increase far greater than the increase in crop production. One reason for this disparity also turns up in the agricultural statistics: between 1948 and 1968, harvested acreage declined by sixteen per cent. Clearly, more crop was being produced on less land; in fact, the yield per acre increased by seventy-seven per cent. Intensive use of nitrogen fertilizer is the most important means of achieving this improvement in yield per acre. Thus, the intensive use of nitrogen fertilizer allowed agribusiness to meet the growing population's need for food while reducing the acreage used for that purpose.

These same statistics also help explain why our water has been polluted more and more. In 1949, an average of about eleven thousand tons of nitrogen fertilizer was used for each unit of crop production (as defined by the United States Department of Agriculture), while in 1968 about fifty-seven thousand tons of nitrogen was used for the same unit of crop production. This means that the efficiency with which nitrogen contributed to the growth of the crop declined fivefold. Obviously, a good deal of the nitrogen fertilizer did not enter the crop and must have ended up elsewhere in the ecosystem. Indeed, in order to achieve very high yields the farmer *must* use more nitrogen than the plants can take up. Though much of the leftover nitrogen leaches from the soil and pollutes the rivers, the farmer, given his present economic situation, has reason to believe that he cannot survive unless he pollutes. To get that last twenty bushels of corn out of an acre which means the difference between profit and loss, the farmer must use nitrogen fertilizer in amounts so great as to be inefficiently taken up by the crop. Since the cost of fertilizer, relative to the resultant gain in crop sales, is lower than that of any other economic "input," the new technology pays him well. The cost in environmental degradation is borne by his neighbors in town who find their water polluted. The new technology is an economic success, but only because it is an ecological failure.

The pesticide story is quite similar: increased annual use at reduced efficiency, leading to an excessive environmental impact. By killing off natural insect predators of the target pest while the pest tends to develop resistance to the substance, the new insecticides become increasingly inefficient. As a result, increasing amounts must be used simply to maintain crop yield. Thus, following the introduction of the new synthetic insecticides, such as DDT, the amount of pesticide used in the United States per unit of agricultural production increased by a hundred and sixty-eight per cent between 1950 and 1967. In Arizona, the use of insecticide on cotton tripled between 1965 and 1967, while yields declined slightly—an agricultural treadmill that forces farmers to move ever faster to stay in the same place. And, again, the decreasing efficiency means an increasing release of insecticide into the environment—where it becomes an increasing threat to wildlife and man.

I have sometimes thought that the nitrogen-fertilizer industry must surely be one of the cleverest business operations of all time. Before the advent of inorganic nitrogen fertilizer, the farmer had to rely heavily on nitrogen-fixing bacteria to maintain the fertility of the soil. These bacteria naturally inhabit the soil either in or around the roots of plants, and can make up for the nitrogen inevitably lost when food is shipped off the farm for sale, or lost by natural processes. The bacteria are a free economic good, available at no cost other than the effort involved in crop rotation and other forms of husbandry of the soil. Now comes the fertilizer salesman with impressive—and quite valid—evidence that crop yields can be increased sharply by the application of inorganic nitrogen in amounts that much more than make up the soil deficit. And not only does the new, salable product replace what nature freely provided; it also helps to kill off the competition. For there is considerable laboratory evidence that in the presence of inorganic nitrogen bacterial nitrogen fixation declines and eventually stops. Under the impact of a heavy use of inorganic nitrogen fertilizer, the nitrogen-fixing bacteria orginally living in the soil may not survive, or, if they do, may mutate into non-fixing forms. It is probable, I believe, that wherever inorganic nitrogen fertilizers have been in continuous and intensive use, the natural population of nitrogen-fixing bacteria has been sharply reduced. And as this main source of natural nitrogen fertility is lost, it will become increasingly difficult to give up the intensive use of nitrogen fertilizer. To the salesman, nitrogen fertilizer is the perfect product—it wipes out the competition as it is used. The new insecticides are equally good business propositions, for by killing off the beneficial insects that previously helped to keep insect pests in check they deprive us of their freely available natural competitors. Like an addictive drug, nitrogen fertilizer and synthetic pesticides create increased demand as they are used: the buyer becomes hooked on the product.

In marketing terms, detergents are certainly among the most successful of the various technological innovations that have transformed the U.S. economy. In a scant twenty-five years, this new product has captured more than two-thirds of the cleaning-agent market from one of man's oldest, best-established, and most useful inventions—soap. That technological displacement of a natural organic product by an unnatural synthetic one is typical of many that have occurred since the Second World War. Soap is produced by causing a natural product, fat, to react with alkali. A typical fat used in soap-making is coconut oil. This is produced by the palm tree from the raw materials water and carbon dioxide by means of energy from sunlight. These are all freely available, renewable resources. The synthesis of the coconut-oil molecule has no adverse impact on the environment. Of course, with inadequate husbandry a copra plantation can deplete the soil, and fuel is burned in the extraction of the oil from the coconut, thus contributing to air pollution. The manufacture of soap from oil and alkali also consumes fuel and produces wastes. But soap, once it has been used and sent down the drain, is broken down by the bacteria of decay, for natural fat is readily attacked by bacterial enzymes. This bacterial action usually takes place in a sewage-treatment plant. Since fat contains only carbon, hydrogen, and oxygen atoms, what is then emitted to surface waters is only carbon dioxide and water. In its production and use, soap has a relatively light impact on the environment.

Detergents are synthesized from organic raw materials originally present in petroleum along with a number of other substances. To obtain the raw materials, the petroleum is subjected to distillation and other energy-consuming processes, with the burned fuel polluting the air. Once purified, the raw materials are used in a series of chemical reactions involving chlorine and high temperatures, which finally yield the active cleaning agent. This is then mixed with a variety of additives, designed to soften hard water, bleach stains, "brighten" wash (this effect is produced by an additive that strongly reflects light, and achieves a simulated whiteness by dazzling the eye), and otherwise gladden the heart of the advertising copywriter. Suitably boxed, this mixture is the detergent. The total energy used to produce the active cleaning agent alone is probably three times that needed to produce oil for soap manufacture, and the resultant air pollution is also tripled. To produce the needed chlorine, mercury is used, and it, too, is released to the environment as a pollutant. In its substitution of man-made chemical processes for natural ones, detergent manufacture inevitably produces greater environmental stress than the manufacture of soap does.

Once detergents have been used, they become serious sources of additional pollution. Here the contrast with soap is striking. Soap has been used for thousands of years—everywhere in the world, in a wide variety of ecological, economic, and cultural settings—without any record, to my knowledge, of pollution problems. But in only twenty-five years detergents have established a notoriously bad environmental record wherever they have been used. The first detergents marketed were synthesized from petroleum derivatives composed of branched molecules. Since the enzymes of the decay bacteria cannot attack such molecules, they passed through sewage-treatment plants unchanged. The industry became aware of the problem only when mounds of foam appeared in streams and, in some places, water drawn from the tap foamed like beer. In 1965, under the threat of legislation, "biodegradable" detergents were introduced in this country; these had unbranched molecules, which decay bacteria could attack. However, the benzene unit at one end of the degradable molecule now became a hazard; in aquatic systems, benzene can be converted

to phenol (carbolic acid), a toxic material. In fact, the new degradable synthetic detergents seem more likely to kill fish than the old ones, although they do not produce the nuisance of foam.

Another pollution problem arises from the phosphate content of detergents, whether degradable or not, for phosphate can stimulate excessive growth of algae, which on their death overburden the acquatic ecosystem with organic matter. Phosphate is added to detergents for two purposes: to combat hard water (it helps to tie up materials, such as calcium, that cause water hardness) and to help suspend dirt particles so that they can be readily rinsed away. Soap itself accomplishes the second of these functions. In hard water, soap is rather ineffective; it can be improved by the addition of a water-softening agent such as phosphate. However, there are other ways to solve the hard-water problem. For one thing, the water in some places is soft and no phosphate is needed, whether soap or detergent is used. Where the water is hard, it can be treated by a household water-softener—a device that could also be built into washing machines. In other words, successful washing can be accomplished without resort to phosphate, which upon being added to detergents worsens their already serious environmental effects. The actual need to replace soap is slight. As a recent chemical-engineering textbook states, "There is absolutely no reason why old-fashioned soap cannot be used for most household and commercial cleaning." The obvious answer to the present confusion over the relative environmental hazards of phosphate and other detergent constituents—such as the caustics and other hazardous materials present in phosphate-free detergents—is to return to soap.

It might be argued, of course, that the mere fact that detergents have driven soap from the market must mean that users find them more desirable than soap, and that detergents are therefore a worthwhile economic good. This argument loses most of its force when advertising is taken into account. A study in England shows that the sales of different brands of detergents are directly proportional to their advertising expenditures. Nor is this a matter of merely acquainting the buyer with the virtues of the product, in the expectation that these virtues will sustain further purchases. For when advertising is cut back, sales fall off. In 1949, Unilever spent sixty per cent of the total sum devoted to the advertising of detergents in England and enjoyed sixty per cent of the total sales; by 1951, its advertising budget had been reduced to twenty per cent of the total and its sales had fallen off to ten per cent. The lesson was learned, and by 1955 the 1951 low in advertising expenditures—and sales—had tripled. It would appear that the most important determinant of detergent sales is advertising, rather than the product's virtues.

In 1946, every ton of cleaner (counting the active cleaning agent in detergent as equivalent to an equal weight of soap) sold in the United States contained about seven pounds of phosphate phosphorus—which eventually entered waterways, where it contributed to the problem of excessive growths of algae. In 1968, a hundred and thirty-seven pounds of phosphate phosphorus was emitted into environmental systems per ton of cleaner used. The technological displacement of soap by detergents has caused a twentyfold intensification of the impact of phosphate from cleaners on the environment, and has done so at no basic gain to the consumer. The displacement of soap by detergents has made us no cleaner than we were, but it has made our environment more foul.

Textile production reflects another important displacement of natural organic materials by unnatural synthetic ones. Some relevant statistics: In 1950 in the United States, about forty-five pounds of fibre was used per capita by fabric mills. Of this total, cotton and wool accounted for about thirty-five pounds, modified cellulosic fibres (such as rayon) for about nine pounds, and wholly man-made synthetic fibres (such as nylon) for about one pound. In 1968, total fibre consumption was forty-nine pounds per capita, of which cotton and wool accounted for twenty-two pounds, modified cellulosic fibres for nine pounds, and synthetic fibres for eighteen pounds. "Affluence," at least as it can be measured by the per-capita use of fibre, was essentially unchanged, but natural materials had been considerably displaced by synthetic ones. This technological displacement has intensified the stress on the environment.

To produce fibre, whether natural or synthetic, both raw materials and a source of energy are required. The molecules that make up a fibre are polymers—chains of repeated smaller units. In cotton, the polymer is cellulose—long, thread-like molecules composed of hundreds of glucose units linked end to end. Energy is needed to assemble such an elaborate structure—both to form the necessary glucose units and to join them into the molecular thread. The energy required to form the cotton fibre is derived by the cotton plant from a free, renewable resource—sunlight. The energy needed to form wool, which is made up of the protein polymer called keratin, is derived from the sheep's food, which, in turn, is derived from sunlight. The crucial link between an energy process and the environment is the temperature at which the process operates. Living things do their energy business without heating up the air or polluting it with noxious combustion products. Whether in the cotton plant or in the sheep, the chemical reactions that put the natural polymers together operate at rather low temperatures, and the energy is transferred efficiently. Nothing is wasted, nothing noxious is produced.

Part of the energy required for the manufacture of a synthetic fibre, like nylon, is contained in the raw materials; since these are usually derived from petroleum or natural gas, their energy represents solar energy previously trapped by fossil plants and animals. This is a non-renewable source of energy. Another part of the energy used in nylon synthesis is that needed to separate the various raw materials from the petroleum or natural gas and to drive the various chemical reactions. Nylon, for example, is produced by a series of from six to ten chemical reactions, operating at temperatures ranging from 200° F. (near the boiling point of water) to 700° F. (above the melting point of lead). This means a considerable combustion of fuel—and resulting air pollution. In addition, such chemical reactions may release waste chemicals into the air or water, again producing an environmental impact not incurred in the production of a natural fibre.

Of course, the production of cotton or wool can also violate ecological principles, and as it is currently carried on it does. In the United States, cotton is now grown with intensive applications of nitrogen fertilizer, insecticides, and herbicides, all of which have serious environmental impacts that are avoided in the manufacture of synthetic fibres. In addition, the gasoline burned by tractors engaged in cotton production produces air pollution. Some of these effects could be reduced considerably; for example, more reliance could be placed on natural control of insect pests. Similarly, nylon production could be improved, ecologically, by reducing waste-chemical emissions. However, the fundamental point here is that even if all possible ecological improvements were made in the two processes, the natural one would still be more advantageous ecologically, because it can use a freely available, non-polluting source of energy—sunlight—for the basic chemical synthesis, whereas the energy for the chemical synthesis of a fibre must be derived from a non-renewable resource, and through high-temperature operations, which even with the best possible controls will pollute the environment with waste heat.

Once a synthetic fibre has been produced, it inevitably generates a greater impact on the environment than a natural fibre. Because the synthetic fibre is man-made, it cannot be disposed of without putting a stress on the environment, whereas cellulose and keratin, the natural polymers in cotton and wool, participate in the soil ecosystem and therefore cannot accumulate as wastes if they are returned to the soil. The ecological fate of cellulose, whether in a leaf, a cotton shirt, or a bit of paper, is well known. If it falls on the ground and becomes covered with soil, it enters into a series of complex biological processes. The cellulose structure is first invaded by molds; their cellulose-digesting enzymes release the constituent sugars into the soil. These stimulate the growth of bacteria. At the same time, the degradation of cellulose allows enzymatic attacks on other polymeric components in a leaf, releasing soluble nitrogenous constituents into the soil. These, too, stimulate bacterial growth. The result is the development of fresh microbial organic matter, which becomes converted to humus—a substance essential to the natural fertility of the soil. Because cellulose is an essential cog in the soil's ecological machinery, it cannot accumulate as a "waste." The keratin of wool behaves similarly in the soil ecosystem. All this results from the crucial fact that for every polymer that is produced in nature by living things there exist enzymes that have the specific ability to degrade it. The contrast with synthetic fibres is striking. The structure of nylon and similar synthetic polymers is a human invention and does not occur in natural living things. Unlike natural polymers, synthetic ones have no counterpart in the armamentarium of degradative enzymes in nature. Ecologically, synthetic polymers are indestructible. Hence, every bit of synthetic fibre or polymer that has been produced on the earth either is destroyed by burning—and thereby pollutes the air—or accumulates as rubbish.

This is apparent to anyone who has wandered along a beach in recent years and marvelled at the array of plastic objects cast ashore. A closer look at such objects—bits of nylon cordage, discarded beer-can packs and plastic bottles—is even more revealing. Like other objects on the beach—bits of glass, for example—the plastic objects are worn by wave action. Ecologically, it is useful to ask about any given material in the environment, "Where does it go?" Where, then, does the material abraded from plastic objects go in the marine environment? The answer has been made apparent by a recent report. Nets that have been used to collect microscopic organisms from the sea now accumulate a new material: tiny fragments of plastic fibres, often red, blue, or orange. In recent years, natural fibres such as hemp and jute have been almost totally replaced by synthetic fibres in fishing lines and fish nets. While the natural fibres are subject to microbial decay, the synthetic ones are not and therefore accumulate. And the chief reason that synthetic cordage has replaced natural materials in fishing operations is that the synthetic fibres have the advantage of resisting degradation by molds, which, as we have seen, readily attack cellulosic materials such as hemp or jute. Thus, the property that makes the synthetic fibre more valuable economically than the natural one—its resistance to biological degradation—is precisely the property that increases its environmental impact.

Not long ago, I saw a poignant photograph

of a wild duck, its neck garlanded with a plastic beer-can pack. Consider this event. A particular plastic pack is formed in a factory, shipped to a brewery, fitted around six cans of beer, further transported until it reaches human hands that separate plastic from beer can. Then, tossed aside, it persists until it comes to float on some woodland lake, where a wild duck, innocent of modern technology, plunges its head into the plastic noose. Such events, bringing into improbable, wildly incongruous, but often fatal conjunction some plastic object and some unwitting creature of the earth, can only become increasingly frequent as plastic factories continue to emit their stream of indestructible objects, each destined by its triumphant escape from the limited life of natural materials, to become waste.

The vast development of modern synthetic organic materials has produced other stresses on the environment. Some of these materials, unlike plastics, are not inert but biochemically active, and in some cases this activity is intentional—to kill insects or weeds, or to defoliate forests and crops in Vietnam. However, living things share a number of similar biochemical systems, so that an unnatural substance that is intended to affect a specific organism is likely to affect others, in different ways, as well. DDT, which attacks biochemical processes in the insect nervous system, also influences the behavior of enzymes in the livers of birds in such a way as to inhibit the formation of egg-shells, which readily break after the eggs are laid. The weed killer 2,4,5-T, sprayed in huge amounts on the forests and croplands of Vietnam, distorts the biochemistry of the plants and denudes them of leaves; it has also been found to induce birth defects in laboratory animals, and may be the cause of increased birth defects among recently born Vietnamese babies. These substances are, in effect, drugs, and ought to be dispensed with appropriate foresight and control, but such control is impossible when tons of the ecological drugs are sprayed across the countryside from the air.

To provide raw materials for the synthesis of the new materials—fibres, plastics, detergents, pesticides, and drugs—there has been a huge concurrent increase in the production of organic chemicals generally (up 746 per cent since 1946). This change, too, has put an increased stress on the environment. For example, the poisoning of fish with mercury is one of the costs that we are paying for synthetic detergents. Manufacturing the detergents now in common use requires large amounts of chlorine, which is usually produced by passing an electric current through a solution of common salt (sodium chloride). Mercury is a valuable adjunct to this process, for it serves not only to conduct electricity but also to trap another product of the reaction, sodium, as an amalgam. The use of mercury for chlorine production in the United States has therefore increased immensely. After the electrolytic process, the sodium-laden mercury is made to react with water; this converts the sodium to the alkali sodium hydroxide, regenerating pure mercury for further use. In this process, large amounts of mercury and water are mixed and circulated, and inevitably some of the mercury is "lost," ending up eventually in the waste-drainage system. The lost mercury is carried to the bottom of rivers and lakes, where bacteria convert the metallic mercury to a soluble form, methyl mercury. This poisons the fish. Mercury poisoning is an unforeseen feature of the "plastic age."

When the automobile and the internal-combustion engine were first developed, no one could have realized that some seventy years later they would become the greatest single source of urban environmental pollution. It is often assumed that automotive pollution is an inescapable result of the huge numbers of vehicles that choke the highways. There is no doubt that the number of cars is part of the problem; in the years from 1947 to 1968, the total number of vehicles on United States roads increased by 166 per cent, and the total vehicle-miles travelled went up by 174 per cent. However, at least two major automotive pollutants, lead and photochemical smog, increased much faster than even the proliferating cars and use of cars. For example, studies of the amounts of lead deposited yearly in polar glaciers show that between 1940 and 1965 the annual entry of lead—which comes almost entirely from gasoline additives—into the environment increased by about 300 per cent, or about twice as fast as the increase in the total consumption of gasoline in that time. The smog situation shows an even greater disparity. Photochemical smog made its début in Los Angeles in the early forties. Since then, it has appeared in most of the nation's large cities and has become vastly more intense in Los Angeles itself. A reasonable estimate of the over-all increase in smog levels in United States cities since the Second World War would be tenfold or so, or in the range of 1,000 per cent—again an increase much greater than the concurrent rise in automobile travel. Clearly, something besides the number of cars and the mileage travelled has changed.

What has changed is the automobile. Cynics are sometimes prone to dismiss the annual changes in Detroit car models as superficial ones, but beneath the recurrent transformation of the automobile's gaudy and increasingly fragile skin technological changes, especially in the engine, have converted it into a highly efficient smog generator. In the internal-combustion engine, gasoline is mixed with air in the cylinders, and the mixture is ignited, at a suitable moment, by means of an electric spark. Just before the fuel-air mixture is ignited, it is compressed by the cylinder piston. The cylinder pressure has a great deal to do with the amount of power that the engine can deliver; generally, the greater the pressure the higher the power output. For reasons that have not yet been fully explained, the automobile industry long ago became committed to increasing the engine's power. In 1925, when the first figures became available, the average American passenger-car engine delivered fifty-five horsepower. By 1946, the average was a hundred horsepower.

Between 1946 and 1958, the average horsepower was raised to two hundred and thirty. In response to foreign competition, United States manufacturers introduced the "compact" car, with a smaller engine. As a result, between 1958 and 1961 the average horsepower dropped from two hundred and thirty to a hundred and seventy-five. Then a curious phenomenon occurred: the "compact" cars gradually grew in size and in engine power, so that between 1961 and 1968 the average horsepower climbed back to reach two hundred and fifty. To increase the horsepower, it was necessary to increase engine compression; the relevant measure, known as the compression ratio, rose from 5.9 in 1946 to 9.3 in 1958. It then dipped briefly, along with horsepower, but, recovering from that aberration, climbed upward again, reaching an average of 9.4 in 1968. Thus, between 1946 and 1968 the low-powered, low-compression engine was displaced. This technological displacement, like many others in that period, has strongly intensified the impact of automobile travel on the environment.

Because high-powered engines use fuels less efficiently than low-powered ones do—especially when the engines are run at low speeds, as they are in car-choked city streets—there has been an increase in the amount of gasoline burned per mile. In 1946, passenger cars averaged about fifteen miles per gallon; by 1968, the average was about fourteen miles per gallon. This meant more fuel combustion—and therefore more air pollution from gasoline-combustion products—per vehicle-mile travelled. A second, more acute pollution problem arises from the special engineering needs of the high-compression engine. At high cylinder pressures, the explosive combustion is apt to be uneven, causing a jarring "knock," which decreases engine power. To suppress engine knock, it was found necessary to add tetraethyl lead to the gasoline. Almost all of this lead—is emitted into the air from the engine exhaust. As the average compression ratio rose, so did the lead content of the gasoline. In 1946, the gasoline used in the United States emitted about fifty thousand tons of lead into the environment. By 1968, the lead emitted had increased to two hundred and sixty thousand tons. In those twenty-two years, the amount of lead used rose from two hundred and eighty pounds per million vehicle-miles to five hundred pounds. In other words, the increase in engine power and compression ratio means that for the same amount of actual use cars now pollute the environment with nearly twice as much lead as they did just after the war.

Then, there is the matter of photochemical smog, which results from the emission of nitrogen oxides—in urban areas, largely from automotive vehicles—into the air. The natural levels of nitrogen oxides in the air are ordinarily very low, but when air is heated—for example, during fuel combustion in the cylinder—nitrogen and oxygen react, and nitrogen oxides are emitted from the engine exhaust. Activated by sunlight, nitrogen oxides combine with waste hydrocarbons from automobile exhaust to produce the noxious final product of photochemical smog, peroxyacetal nitrate, often referred to as PAN. This can take the form of a whitish haze, tinged with brown, that causes the eyes to smart. Now, as compression ratio increased, so did the engine's operating temperature, and this, in turn, sharply increased the amount of nitrogen oxides emitted per unit of engine use. The emission of nitrogen oxides is also affected by a number of other engine characteristics. When these are taken into account, it can be estimated that whereas the emission of nitrogen oxides in the exhaust of the average 1946 passenger car came to about five hundred parts per million, the emission of the average 1968 automobile was twelve hundred parts per million. Thus, the emission of nitrogen oxides for each unit of vehicle use more than doubled over this period. When the increased mileage and increased gasoline consumption in the period are also taken into account, total emission of nitrogen oxides is found to have increased about seven-fold—a rise that begins to account for the sharp increase in smog levels.

In the fall of 1965, exhaust-control devices appeared on new 1966-model cars in California, and the emission of waste hydrocarbons began a downward trend in Los Angeles. Between 1965 and 1968, emission of waste hydrocarbons from motor vehicles was reduced from 1,938 tons per day to 1,720. (Without controls, emission would have risen to 2,400 tons per day by 1968.) Eye irritation was also reduced. At the same time, the level of another important pollutant emitted by motor vehicles, carbon monoxide, was also reduced by the new devices. It might appear, then, that by 1968 Los Angeles would have been ready to celebrate the end of a long and frustrating search for a solution to the smog problem. But at that point the situation took a new and ominous turn: the improvements in exhaust emissions brought on a new problem. For, coincident with the twelve-percent drop in hydrocarbon emissions between 1965 and 1968, the burden of nitrogen oxides in the Los Angeles air increased by twenty-eight per cent. The nitrogen oxides in automobile exhausts include both nitric oxide and nitrogen dioxide. While nitric

oxide is relatively innocuous (except as an ingredient of the smog-forming reaction), nitrogen dioxide is highly poisonous, with a long history as a serious industrial hazard. The gas destroys the cells of the lungs, tends to enlarge lung blood vessels, and, at a sufficient high concentration, causes an accumulation of fluid in the lungs, which may lead to death. Nitrogen dioxide, a colored gas, tinges the air a kind of whiskey brown, and as the concentration has increased in the Los Angeles air serious visibility problems have arisen—in the air lanes and along the high-speed freeways. In addition, nitrogen dioxide is toxic to plants; at levels of less than one part per million, the growth of tomato plants is reduced about thirty per cent. In 1965, nitrogen dioxide in Los Angeles had exceeded what had been designated the "adverse" level on a hundred days. In 1968, three years after the introduction of exhaust-control devices, that level was exceeded on a hundred and thirty-two days.

There are two reasons for the increase in the level of nitrogen dioxide. One is the simple ecological rule that "everything must go somewhere." If hydrocarbon emissions are reduced, the nitrogen oxides that might have combined with hydrocarbons to form smog necessarily accumulate in the air. The other reason for the rise in nitrogen oxides is that in devising the present pollution controls the automobile manufacturers considered only the demand for reduced emissions of hydrocarbons and carbon monoxide. This demand led them to make engine modifications designed to increase the thoroughness of fuel combustion in the cylinders by increasing the engine's air intake. But increased fuel combustion also increases the combustion of the major constitutent of the air, nitrogen, generating nitrogen oxides. Thus, the engine modifications introduced for the purpose of reducing the emission of hydrocarbons tended to increase the emission of nitrogen oxides, and in enforcing the new automatic-engine modifications Los Angeles had simply traded one pollution problem for another. Catalytic exhaust devices have been developed for the purpose of converting engine-generated nitrogen oxides into innocuous products. However, it appears that the catalysts are poisoned by the lead used as a gasoline additive, and here the smog problem reaches to the heart of the automotive-pollution problem—the modern high-powered, high-compression gasoline engine, which operates effectively only on high octane fuels. Such fuels have usually been produced by the addition of tetraethyl lead, and the elimination of lead requires a large-scale change in the petroleum-refining industry—or else a change in the design of automotive engines. There is also a serious question about how effective the increasingly complex exhaust devices are under actual conditions of use. For example, California tests show that the exhaust devices on 1966 models lost their effectiveness for controlling hydrocarbon and carbon-monoxide emissions and, on the average, exceeded the California emission standards after five to ten thousand miles of use.

In part, the increase in automobile travel during the last twenty-five years is a consequence of changes in the distribution of residences and places of work. Traffic studies show that about ninety per cent of all automobile trips are ten miles or less in length; this class of trips represents about thirty per cent of total automobile mileage travelled. The mean work-residence travel distance in U.S. metropolitan areas is about five miles for central-city dwellers and about six miles for those living in suburban areas. This is statistical evidence of what millions of people know from their own daily frustration: that in most urban areas the roads are clogged twice a day with people driving to and from work—a consequence of the separation between place of work and residence and the absence of adequate means of mass transportation. A related problem that has developed as a result of the American growth pattern since 1946 is the displacement of railroad freight haulage by trucks. The ecological cost of this displacement is evident in the following figures: the energy required to move a ton of freight one mile by rail now averages about 624 B.T.U. (British thermal units), and by truck about 3,460 B.T.U. This means that for the same amount of freight haulage trucks burn nearly six times as much fuel as trains—and emit about six times as much environmental pollution. Moreover, the amount of power required to produce the cement and steel for a mile of four-lane highway—essential for truck traffic—is 3.6 times the power required to produce a mile of steel track for comparable rail traffic. Finally, the highway takes up a four-hundred-foot right-of-way, while the railroad takes only a hundred feet. In all these respects, the displacement of railroads by automotive vehicles for freight—and also for passenger travel—has intensified the environmental impact of transportation.

The electric-power industry, which has expanded rapidly in the postwar period, is still another source of major pollution problems. These include suphur dioxide, nitrogen oxides, and dust emitted by power plants that burn fossil fuels; radioactive emissions, and the threat—small but with enormously catastrophic potential—of an accident, from the operation of nuclear-power plants; and the emission of waste heat to the air and nearby surface waters by both types of plants. The growth in the use of electric power has been attributed, with justification, to the modernity of our economy and, with much less justification, to our supposed affluence. The statistics appear straightforward. In the United States, power consumption by the economically active population in 1968 was about 20,500 K.W.H. (kilowatt-hours) per capita, as opposed to about 2,900 for Chile, 260 for India, and 230 for Thailand.

(The United States produces thirty-four per cent of the world's electric-power output.) However, electric power is not in itself capable of satisfying any known human need, and its contribution to human welfare needs to be measured in terms of the economic goods that it can produce. Here we discover another serious failing—in terms of human welfare—of postwar technology: the new productive technologies are far more costly in the consumption of electric power and other forms of fuel-generated energy than the technologies they have displaced. For example, aluminum, which has increasingly displaced steel and lumber as a construction material, requires for its production about fifteen times as much fuel energy per pound as steel and about a hundred and fifty times as much fuel energy as lumber. Even when the fact is taken into account that the weight of aluminum needed for a given purpose is less than that of steel. * * *.

Indeed, there are powerful links between the environmental crisis and the economic system we live under. Conventional economic science conceives of the production and distribution of wealth as a vastly elaborated development of the ancient marketplace. Goods are produced and services performed so that they may be exchanged for other goods and services; values are determined, at least as a first approximation, by the interplay of supply and demand. The term "externality" has been introduced into economic theory to describe what once appeared to be a rather rare departure from this basic exchange process. In its simple form, an exchange is both mutually beneficial and voluntary; it takes place because both parties hope to gain from it. An externality, by contrast, may be neither beneficial nor voluntary for all parties in the transaction: Mercury benefits the chlorine-alkali producer but harms the commercial fisherman; it is used voluntarily by one party but is involuntarily inflicted upon the other. This is an example of a negative externality. In theory, but less commonly in practice, an externality may be economically positive—as in the case of a householder who happens to live next to a well-kept golf course. Now that very large negative externalities have begun to emerge in the form of environmental degradation, economists have begun to devote considerable attention to this once minor facet of economic theory. They face some difficult questions: How can the social *costs* of environmental deterioration be evaluated and met by the operation of the economic system? Are the basic operational requirements of the major economic systems—capitalism and socialism—compatible with the ecological imperatives we face?

The conventional solution proposed for a country like the United States is to "internalize the externalities," by taxing pollution or raising the prices of products to cover its costs. However, even if these measures are adopted, many serious difficulties will remain. In the private-enterprise system, one of the chief motivating forces is private profit. What is the connection between pollution and profit in a private-enterprise economic system like that of the United States? Many of the large-scale technological displacements in industry and agriculture that have occurred since 1946 are much more prone to pollute than the older ones they have displaced, and the new technology has clearly played an important role in the profitability of postwar business enterprise. A good example is the massive displacement of soap by synthetic detergents. In 1947, when the cleaning-product industry produced essentially no detergents, its profit amounted to about thirty per cent of sales. In 1967, when the industry produced about one-third soap and two-thirds detergents, the profit was about forty-two per cent of sales. From the data for intervening years, it can be computed that the profit on pure-detergent sales is about fifty-two per cent, considerably higher than the profit on pure-soap sales. This may help to explain why soap, despite its continued usefulness for most cleaning purposes, has been driven off the market by detergents. Another important example is provided in the displacement of small, low-powered automobiles by large, high-powered ones. An article in *Fortune* has noted, "As the size and selling price of a car are reduced, then, the profit margin tends to drop even faster. A standard U.S. sedan with a basic price of $3,000, for example, yields something like $250 to $300 in profit to its manufacturer. But when the price falls by a third, to $2,000, the factory profit drops by about half. Below $2,000, the decline grows even more precipitous." The introduction of a car of reduced environmental impact, which would necessarily have a relatively low-powered, low-compression engine and a low over-all weight, would sell at a relatively low price, and it would therefore yield a smaller profit than the standard heavy, high-powered, high-polluting vehicle. This may explain the recent remark by Henry Ford II that "minicars make miniprofits." Steel and lumber have been increasingly displaced as construction materials by aluminum, cement (in the form of concrete), and plastics. In 1967, the profits (in relation to total sales) from steel production by blast furnaces and lumber production were 12.5 per cent and 15.4 per cent, respectively. The products that have displaced steel and lumber yielded significantly higher profits: aluminum, 25.7 per cent; cement, 37.4 per cent; plastics and resins, 21.4 per cent. Again the displacement of technologies with relatively weak environmental impacts by technologies with stronger impacts has been accompanied by significant increases in profitability.

The costs of environmental degradation, it appears, are borne chiefly by society as a

whole, in the form of externalities, rather than by the producer. A business enterprise that pollutes the environment is therefore being subsidized by society, and to this extent the enterprise, though free, is not wholly private. When a manufacturing process borrows from the ecosystem and incurs what might be called "a debt to nature" in the form of pollution, there is an immediate saving for the producer. At the same time, pollution often adds to the living costs of the population as a whole, most of which consists of wage earners rather than entrepreneurs. Thus, when the workers in the vicinity of a power plant find their cleaning costs increased because of soot emitted by its stacks, their wages are reduced by the amount of that increase. In essence, the workers' extra cleaning costs subsidized part of the cost of operating the power plant. Of course, it may have taken fifteen or twenty years of environmental pollution from industrial plants along the shore of Lake Erie, say, before the burden of waste reduced the water's oxygen content to zero, halted the self-purification process, and fouled the beaches so badly that in order to enjoy a swim the plants' workers had to add to their cost of living the price of admission to a swimming pool. Similarly, chronic low-level exposure to radiation, mercury, or DDT may shorten a wage earner's life without reducing his income or even causing him to incur extra medical costs during his lifetime. In this case, the cost of pollution is not met for a long time; the bill is finally paid by the wage earner's premature death, which—apart from the feelings of his family and friends—can be reckoned in terms of a certain number of years of lost income.

The economic theory of the private-enterprise system is based very substantially on the advantages of growth. And yet the total rate by which men exploit the earth's ecosystem has some upper limit; if this rate is exceeded, the system will eventually be driven to collapse. Hence, all productive systems must eventually reach a no-growth condition—at least with respect to the accumulation of capital goods designed to exploit the ecosystem, and the products that these yield. In a private-enterprise system, a no-growth condition means no further accumulation of capital. If the accumulation of capital, through profit, is a basic driving force of this system, as it seems to be, it is difficult to see how the system can continue to operate under conditions of no growth. Moreover, different ecological cycles vary considerably in their intrinsic rates—rates that cannot be exceeded if breakdown is to be avoided. For example, the natural turnover rate of a soil system is considerably lower than that of an aquatic system—a fish farm, let us say. It follows that if the private-enterprise system is to exploit these different ecosystems concurrently without inducing ecological breakdown, there will be different rates of economic return. But when one enterprise yields a lower return than another, investment funds will tend to be transferred to the latter. Of course, many marginal enterprises that yield profits significantly below those available elsewhere in the economic system have important social value. It will perhaps be possible to keep them going by means of subsidies, but very often the subsidies will need to be so large as to amount to naturalization—a contradiction of private enterprise. Finally, since the "debt to nature" represented by environmental pollution is essentially a saving in production costs on the part of the entrepreneur, it provides a cushion against the effects of internal problems in the economic system—such as the conflict between entrepreneur and employee over wages. Now we know that the debt must be paid, and in this sense the emergence of an ecological crisis must be regarded as the signal of an emerging crisis in our economic system.

What little I have been able to learn from available reports indicates that the problems of environmental pollution in industrialized socialist nations are not basically different from those typical of industrialized private-enterprise nations like the United States. The pollutants in surface waters in the Soviet Union are similar in both type and origin to the ones that trouble the United States and other developed countries. They include wastes from municipalities, food-processing plants, and pulp and paper plants, industrial chemicals and metals, oil spills, and drainage of fertilizer. There is no evidence that the new postwar technologies introduced in the Soviet Union differ much from those which dominate American production, and the evidence that environmental pollution in Russia is following about the same course it has taken in capitalist countries suggests that the drive for "plan fulfillment" takes its toll of the ecosystem just as the drive for profits does. However, the socialist system does have, in theory, several advantages over the private-enterprise system in dealing with ecological problems. One of these is the relative ease of national planning, which is essential for an ecologically rational system of production. Another advantage relates specifically to the problem of growth. Though it is true that the Soviet Union and other socialist states have emphasized economic growth just as heavily as capitalist states have, the theory of socialist economics does not appear to require that the growth should continue indefinitely. Moreover, it should be comparatively easy for a socialist system to enforce varying rates of return from productive activities in different sectors of the ecosystem.

In any case, both socialist and capitalist economic theories have apparently developed without taking into account the limited biological capital represented by the ecosystem. As a result, neither of the systems is now well prepared to confront the environmental crisis, and both will be severely tested by it. For if any civilization is to survive, industry, agriculture, and transportation must meet the inescapable demands of the ecosystem. This will require the development of major new technologies, including methods of returning sewage and garbage directly to the soil; the replacement of many synthetic materials by natural ones; the reversal of the present tendency to retire soil from agriculture and to elevate the yield per acre; the replacement of synthetic organic agents by biological means of controlling insects and other pests; the discouragement of power-consuming industries; the development of land transport that operates with maximum fuel efficiency at low combustion temperatures and with minimum land use; essentially complete containment and reclamation of wastes from combustion processes, smelting, and chemical operations; essentially complete recycling of all reusable metal, ceramic, and paper products; and ecologically sound planning of land use, especially in urban areas. In effect, all major elements of the new productive enterprises constructed on the basis of ecologically faulty technology have to be rebuilt along ecologically sound lines. Obviously, these changes must be worldwide; for example, if industrialized countries were to give up the large-scale use of synthetic materials, tropical countries would need to take up the slack and manufacture such products as soap, tires, and fabrics from natural materials for world commerce. Like the ecosphere itself, the peoples of the world are linked by their separate but interconnected needs to a common fate. The world will survive the environmental crisis as a whole or not at all.

We live in a time that is dominated by enormous technical power and extreme human need. The power is self-evident in the megawattage of power plants and the megatonnage of nuclear bombs. The human need is painfully evident in the sheer number of people now and soon to be living, in the deterioration of their habitat, the earth, and in the tragic worldwide epidemic of hunger and want. The gap between brute power and human need continues to grow, for the power fattens on the same faulty technology that intensifies the need. Everywhere in the world, there is evidence of a deep-seated failure to use the competence, the wealth, the power at human disposal for the maximum good of human beings. The environmental crisis is a major example of this failure. It has come about because the means by which we use the ecosphere to produce wealth threaten the ecosphere itself. The present system of production is self-destructive.

My own judgment, based on the evidence now at hand, is that the present course of environmental degradation, at least in industrialized countries, represents such a serious challenge to essential ecological system that if it is continued it will destroy the ability of the environment to support a reasonably civilized human society. Some number of human beings might well survive such a catastrophe, for the collapse of civilization would reduce the pace of environmental degradation. What would then remain would be a kind of neo-barbarism, with a highly uncertain future.

Deep pessimism is perhaps a natural aftermath of the shock of recognizing that the vaunted "progress" of modern civilization is only a thin cloak for global catastrophe. No scientist, economist, or politician—no committee of experts—could possibly come up with a specific plan for resolving the environmental crisis. To pretend otherwise is only to evade the real meaning of the environmental crisis: that the world is being carried to the brink of ecological disaster not by a single fault, which some clever scheme could correct, but by a phalanx of powerful economic, technological, and social forces. What is required is nothing less than a change in the course of history. I am convinced, however, that once we pass beyond mere awareness of impending disaster and begin to understand how we have reached our present predicament and where the alternative paths ahead can lead, there is reason to hope. After all, the environmental crisis is not the product of man's biological capabilities, which could not change in time to save us, but of his social actions, which are subject to much more rapid change. If the environmental crisis is the result of social mismanagement of the world's resources, then it can be resolved and man can survive in a humane condition by consciously bringing his social organization into harmony with the ecosphere.

Here we can learn a basic lesson from nature: that nothing can survive on the planet unless it is a cooperative part of a larger whole. Life itself learned that lesson on the primitive earth—for the first living things, like modern man, consumed their nutritive base as they grew, converting the geochemical store of organic matter into wastes that could no longer serve their needs. Life as it first appeared on the earth was embarked on a linear, self-destructive course. What prevented extinction was the appearance, in the course of evolution, of a new life form, which reconverted the waste of the primitive organisms into fresh organic matter. The first photosynthetic organisms transformed the rapacious linear course of life into the earth's first great ecological cycle. By closing the circle, they achieved what no living organism alone can accomplish—survival. Human beings have broken out of the circle of life, driven not by biological need but by the social organizations that they have devised to "conquer" nature. Once more, in order to survive, we must close the circle. We must learn how to restore to nature the wealth we borrow from it.

CONSTITUTIONAL CONVENTIONS

The PRESIDING OFFICER. Under the previous order, the Chair now lays before the Senate the unfinished business which will be stated.

The assistant legislative clerk read as follows:

S. 215, a bill to provide for calling constitutional conventions for proposing amendments to the Constitution of the United States, on application of the legislatures of two-thirds of the States, pursuant to article V of the Constitution.

ADDITIONAL PERIOD FOR THE TRANSACTION OF ROUTINE MORNING BUSINESS

Mr. BYRD of West Virginia. Mr. President, in view of the fact that no action is contemplated on the unfinished business today—in accordance with the announcement of the distinguished majority leader earlier—I ask unanimous consent that there be an additional period for the transaction of routine morning business at this time for not to exceed 6 minutes, with statements therein limited to 3 minutes.

The PRESIDING OFFICER. Without objection, it is so ordered.

A BALANCE OF POWER MUST BE MAINTAINED IN THE MIDDLE EAST

Mr. BYRD of West Virginia. Mr. President, of all the trouble-spots that hold dangers for the peace of the world, none is more potentially inflammatory than the Middle East.

It is no secret that the Soviet Union is and has been supplying advanced weaponry and skilled military personnel to some of the Arab States in a volume that can only result in a dangerous imbalance of power. Egypt and some of the other Arab States have made it clear that when they consider the time is ripe—or perhaps more realistically when they decide that retribution cannot be visited upon them—they will renew the hostilities that cost them so dearly during the 6-day war.

Mr. President, it does not require emphasis from me that such intentions hold a threat that the United States must ignore and on which our policy in the Middle East is currently based. For some time past, the Government of Israel, against whom these threats are directed, has requested the aid of this country in the form of defensive aircraft—namely, the Phantom F–4 jet aircraft. This request has been pending for a dangerously long time. With every week that passes, the buildup of military strength against Israel increases, and even more disturbing to contemplate, confidence to use it becomes stronger as the arms imbalance becomes more obvious.

The distinguished minority leader has proposed a resolution, widely bipartisan and supported by nearly 80 Members of this body resolving that the United States immediately take affirmative action to grant Israel's request for additional F–4 aircraft and provide such supporting equipment and assistance as are essential for tranquillity and Israel's deterrent capability. The resolution further asks that the U.S. Government should oppose any attempts at the United Nations to alter the meaning and effect of Security Council Resolution 242 of November 22, 1967, and should reaffirm the importance of secure and defensible borders as a vital element in a peace settlement to be negotiated by the parties themselves.

Mr. President, the chances of a negotiated peace settlement, in my view, are extremely slim as long as one side feels it has insurmountable superiority in military strength. The simple analogy of the school bully who beats up the little kids but shys away from boys his own size seems to me to have particular application.

Though the theorists will say it is incongruous to try to preserve the peace by supplying weapons of war, realism leaves us no choice.

Mr. President, the sands are running out along the banks of the Suez Canal. We must take immediate, positive action to supply Israel with the means to defend herself. If we fail to do so, American policy, which has so far helped maintain an admittedly uneasy peace will prove to have been mere lipservice.

Mr. President, I urge all Members of the Senate to give support to the resolution.

UNANIMOUS-CONSENT AGREEMENT

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that I may have printed in the RECORD, at the request of the distinguished Senator from Alaska (Mr. GRAVEL), certain statements prepared by him along with supporting data in connection with those statements.

The PRESIDING OFFICER. Without objection, it is so ordered.

THE ILLUSION OF NUCLEAR SAFETY

Mr. GRAVEL. Mr. President, a report which is likely to jolt Congress into action was released yesterday by the union of concerned scientists in Cambridge, Mass. It was prepared by Daniel Ford, a Harvard economist; by nuclear and high-energy physicist Dr. Henry W. Kendall of MIT; by nuclear physicist Dr. James MacKenzie of the Audubon Society; and by nuclear engineer Dr. Ian Forbes of the Lowell Institute of Technology.

Mr. President, I ask unanimous consent to have their report, entitled "A Critique of the New AEC Design Criteria for Reactor Safety Systems," printed at the end of my remarks.

The report says:

Reactor safety with respect to major accidents and consequent wide-spread damage and loss of life is in a very unsatisfactory state. The (AEC's emergency cooling) interim criteria make no adequate remedial contribution and can serve only to prolong public exposure to extreme risks over which there is inadequate control, and which criteria gloss over with only the appearance and illusion of safety. The situation should not be allowed to persist.

The preceding 28 pages of the report are devoted to a well-documented and clearly presented technical analysis of what is wrong with the AEC's interim criteria for safety.

Perhaps the most striking thing of all about the new Cambridge report is the contrast between its message and the AEC's message on the very same subject.

When you read about the obvious flaws in the AEC's safety criteria, at first you may suppose that the AEC experts must be incredibly incompetent. But when you consider the documents on which the Cambridge group bases its conclusions, you realize that they were written mostly by AEC people.

The AEC people do realize the hazards with the nuclear power plants, and also with the waste disposal plans at the Carey Salt Mine in Kansas. They are not technically incompetent for their jobs, but they may well be morally incompetent for those jobs.

They should be making every effort to alert the public and Congress to the hazards they recognize, but they seem to act fearfully.

Unless we provide funding for adversary scientists, who are paid to tell us what is wrong with a program, the whole country will find itself in more and more serious troubles.

The point was well made in chapters 12 and 13 of the book "Poisoned Power," by Dr. John Gofman and Dr. Arthur Tamplin—Rodale Press.

The idea was translated into legislative solution by my bill S. 2430—August 4—and by Senator MAGNUSON'S amendment No. 364 to S. 1684.

The new report from Cambridge contains an important reminder from the group's first report, which I placed in the RECORD July 31—pages 28493–28500:

. . . A major (nuclear power plant) accident might expose large numbers—possibly tens or hundreds of thousands of people to lethal levels of radioactivity.

Congress cannot afford to ignore such a hazard any longer; it may really blow up in our faces. I would like to quote the senior member of the Joint Committee on Atomic Energy, Representative CHET HOLIFIELD, when he was arguing on the House floor against the passage of the Price-Anderson act in 1957. In spite of his speech, Congress did pass the act, which induced private industry to move into the most dangerous process known to man—nuclear fission.

Mr. HOLIFIELD asked:

Are you going to cover up with $500 million worth of government money a catastrophe that would decimate the city of Detroit, that might wipe out a hundred thousand people, and injure other thousands genetically for all time, as well as contaminate the land for an undetermined length of time? I am making the point that you cannot put these reactors . . . near the cities and take the human-life risk and try to cover it up with $500 million of government liability . . . I say that until they can tell you there is not going to be a blow-up, you Members of Congress are taking upon your . . . hearts and upon your minds and upon your souls the responsibility in case there is a blow-up in this field.

Fourteen years later, the Cambridge report—among others—makes it clear there is still no valid assurance whatso-

ever that we would not have a nuclear disaster very soon.

It is possible that the Senate supposed that the emergency cooling safety problem was taken care of by the adoption of my amendment to the AEC authorization bill on July 20. That amendment provided the AEC with an extra $2.3 million in fiscal year 1972 to accelerate its effort to solve the problems described in the Cambridge reports—see also CONGRESSIONAL RECORD, July 20, pages 26061–26064, 26074–26090.

However, the Cambridge report emphatically confirms what I have been saying since last February: The only solution for protecting this country's safety is a complete moratorium on the construction of nuclear powerplants until at least the fundamental problems of the program have been solved.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

A CRITIQUE OF THE NEW A.E.C. DESIGN CRITERIA FOR REACTOR SAFETY SYSTEMS

(By Daniel F. Ford, Henry W. Kendall, James J. MacKenzie)

(NOTE.—Original page numbers appear in parenthesis or at start of paragraphs.)

Presented by the Union of Concerned Scientists, Cambridge, Massachusetts, October 1971.

(NOTE.—Copies of this and our earlier report, *Nuclear Reactor Safety: An Evaluation of New Evidence* (July 1971), are available from the Union of Concerned Scientists, P.O. Box 289, M.I.T. Branch Station, Cambridge, Mass. 02139. Please include $1 for each report, to help cover the costs of printing, handling, and postage.)

"Heavy reliance has been placed on engineering safety features such as the ECCS [Emergency Core-Cooling System], where technology is complex . . . Some of the information needed to confirm convincingly the adequacy of such systems, which are intended to arrest the course of hypothetical large primary system failures, is not yet available."—George M. Kavanagh, Assistant General Manager of Reactors, US Atomic Energy Commission (quoted in *Science*, May 28, 1971, p. 191).

Daniel F. Ford—Economist. Coordinator, environmental research, Harvard Economic Research Project, Harvard University.

Henry W. Kendall—Nuclear and High Energy Physicist. Faculty, Physics Department, Massachusetts Institute of Technology. Chairman, Union of Concerned Scientists Committee on Environmental Pollution.

James J. MacKenzie—Nuclear Physicist. Joint Scientific Staff, Massachusetts & National Audubon Societies. Chairman, Union of Concerned Scientists.

The Union of Concerned Scientists is a Boston area coalition of several hundred scientists, engineers, and other professionals who are concerned with the impact of uncontrolled technology on society. UCS was founded on March 4, 1969 and has been most active in the areas of arms control and environmental pollution.

UCS is an advocate organization dedicated to the protection of the long-term public interest. Its Committee on Environmental Pollution has worked on problems related to nuclear power, air and water pollution, oil spills, highway construction, and unrestricted pesticide use.

The Union of Concerned Scientists is the Boston chapter of the Washington-based Federation of American Scientists.

We wish to thank Dr. Ian A. Forbes of the Nuclear Engineering Department of the Lowell Institute of Technology for many helpful discussions during the preparation of this paper. Dr. Forbes has expressed total agreement with the conclusions and recommendations of this report.

Table of Contents—I. Introduction, 1; II. The Interim Criteria and Recommended Computer Codes, 4; III. Criticisms of the Interim Criteria, 6; IV. Criticisms of the Computer Codes, 16; V. Conclussions and Recommendations, 26.

I. INTRODUCTION

Page 1—Nuclear power reactors are expected to play an increasingly important role in supplying electric power to the nation. Electric power consumption has a rate of growth many times that of the U.S. population, and, with increasing difficulties in obtaining clean fossil fuels, the pressures to tap copiously the energies locked in the atomic nucleus will soon become very great. Already 22 nuclear power stations are operating, 55 are under construction, and 44 more reactors are ordered.

Unique and very substantial hazards are associated with nuclear power reactors and dominant priority must be given to the protection of the public health. Nuclear reactors contain enormous inventories of radioactive materials, the "ashes" from the fission of uranium, whose accidental release into the environment would be a catastrophic event. Great reliance is placed on safety features (the so-called "engineered safeguards") to prevent or largely mitigate the consequences of reactor accidents. Foremost among safety systems is the emergency core-cooling systems designed to prevent a rupture in a reactor primary cooling system from causing a meltdown of the reactor core and subsequent release of lethal radioactivity into the environment. The emergency core-cooling system is intended to cool the reactor core if the primary coolant is lost, for example, through a pipe rupture.

Recently developed evidence, from various experiments conducted under the auspices of the United States Atomic Energy Commission (AEC), suggests that emergency core-cooling systems may well be unable to perform the functions for which they are designed, and that the margin of safety previously thought to exist in these systems' operations during a loss-of-coolant accident is very much smaller than has been expected or may, in fact, be non-existent. Four members of the Union of Concerned Scientists, responding to reports of deficiencies in currently designed emergency core-cooling systems, carried out a detailed technical assessment of the new evidence. The Union of Concerned Scientists report, (page 2) *Nuclear Reactor Safety: An Evaluation of New Evidence* (Cambridge, Mass., July 1971; reprinted in *Nuclear News*, September 1971), discusses the recent evidence of inadequacies in the emergency core-cooling systems in the perspective of both an analysis of the severe consequences that would accompany these inadequacies in a loss-of-coolant accident and a general review of the available experimental data pertaining to the expected performance of presently designed emergency core-cooling systems. The results of calculations were presented indicating that a major accident might well expose very large numbers (possibly tens or hundreds of thousands) of people to lethal levels of radioactivity. Information assembled from the AEC's own assessments of the progress of its safety research program indicated a fundamental lack of basic knowledge about the nature and sequence of events during a loss-of-coolant accident and an extensive lack of experimental data confirming the reliability of emergency core-cooling systems.

The Atomic Energy Commission, also evidently disturbed by the implications of the accumulating evidence of emergency core-cooling system inadequacy, temporarily delayed nuclear power plant licensing (see *Washington Post*, May 26, 1971, p. 1) and convened an *ad hoc* Task Force, selected from within the AEC Regulatory Staff, to review the adequacy of emergency core-cooling systems in the light of the recent experiments. This internal AEC Task Force has not as yet released any report on its evaluation of the recent indications of emergency core-cooling system deficiencies. Without waiting for its Task Force to complete its work, the AEC has meanwhile resumed nuclear power plant licensing and adopted an Interim Policy Statement entitled *Interim Acceptance Criteria for Emergency Core-Cooling Systems for Light-Water Power Reactors*. This Interim Policy Statement was published in the *Federal Register* on June 29, 1971 [FR Document No. 71–9185], and was accompanied by a waiver of the usual sixty-day waiting period during which written comments on the proposed policy could be filed with the Commission for consideration before final adoption of the new criteria. In initiating such an extraordinary procedure, the Commission noted:

Page 3—"In view of the public health and safety considerations . . . the Commission has found that the interim acceptance criteria contained herein should be promulgated without delay, that notice of the proposed issuance and public procedure thereon are impracticable, and that good cause exists for making the statement of policy effective upon publication in the *Federal Register*."

We believe that the Commission should have waited until the Regulatory Staff Task Force's re-evaluation of emergency core-cooling system reliability was available before it promulgated new design criteria. According to Task Force head, Dr. Stephen Hanauer, only an oral report on its preliminary impressions was presented to the Commission by the Task Force prior to issuance of new design criteria; hence, there is substantial uncertainty about the new criteria.

The Union of Concerned Scientists has found abundant evidence of weakness in the Interim Criteria. We have evaluated the Interim Criteria, in the absence of the Task Force report, as part of a continuing scrutiny of reactor safeguards and as a follow-up to our earlier report. This evaluation of the Interim Criteria has shown that they are substantially inadequate and, we believe, cannot add even marginally to the presently narrow or possibly non-existent margins of safety in a loss-of-coolant accident. It is the purpose of this paper to describe our evaluation of the Interim Criteria and our assessment of the meager assurance their application can provide. On the basis of our evaluation, we present recommendations for the first important steps to be taken to develop adequate reactor safety criteria.

The next section outlines the Interim Criteria and describes the computer codes that are required for their application. The next following two sections discuss the weakness in the Criteria and the limitations presently inherent in the computer codes. A final section summarizes the conclusion of this study and presents our recommendations.

II. THE INTERIM CRITERIA AND RECOMMENDED COMPUTER CODES

Page 4—The Interim Policy Statement on emergency core-cooling systems issued by the AEC on June 29, 1971, was divided into two parts: one setting performance standards that every emergency core-cooling system should meet, the other recommending analytical tools (computer codes) to determine whether a given emergency core-cooling system meets the general standards. This section outlines the new standards promulgated by the AEC and describes the recommended computer codes.

The Interim Criteria require, for all light-water power reactors, that emergency core-cooling systems be so designed that the calculated course of any loss-of-coolant accident is limited as follows:

1. The calculated maximum fuel element

cladding temperature does not exceed 2300° F.

2. The amount of fuel element cladding that reacts chemically with water or steam does not exceed 1% of the total amount of cladding in the reactor.

3. The clad temperature transient is terminated at a time when the core geometry is still amenable to cooling, and before the cladding is so embrittled as to fail during or after quenching.

4. The core temperature is reduced and decay heat removed for an extended period of time, as required by the long-lived radioactivity remaining in the core.

Reactors granted operating licenses before January 2, 1968, need not comply with the criteria before July 1, 1974; otherwise, compliance is required before October 1, 1971. Reactors in the first group, to the extent that they are not in compliance with the criteria, are subject to additional criteria, including scheduling of improvements, an augmented inservice inspection program, and installation of equipment to facilitate detection of primary-system leakage. Extensive provision is made for variances from the application of the Interim Criteria.

Page 5—In addition to defining criteria that an acceptable emergency core-cooling system should meet, the Interim Policy Statement also recommends the use of appropriate computer codes to evaluate the expected performance of each reactor's emergency core-cooling system in accident situations. The evaluations require computations of the maximum cladding temperatures and predictions of the extent of chemical reactions. These computer codes embody mathematical models that are intended to allow prediction of the temperature history of the fuel rod cladding during a loss-of-coolant accident. This procedure yields the calculated course of a loss-of-coolant accident to which the Interim Criteria apply.

The computer code calculations generally involve two or more steps. First, the core fluid flow conditions are determined by one computer program. Then these computed core fluid conditions are used as input information in a core heat-transfer program that calculates the peak cladding temperature reached during core heat-up in a loss-of-coolant accident with the emergency core-cooling system operating. Conformance with the Interim Criteria is thus supposed to be determined by comparing the output of these computer codes with the four requirements specified on page 4.

The margin of safety established by conformance to the Interim Criteria is thus determinated both by the soundness of the criteria themselves and by the validity of the computational models. The quality of the initial assumptions, the nature of the approximations and compromises that must be made in producing a mathematical model and programming it on a computer, and the extent to which the quality of the modeling procedures have been confirmed by experimental measurement, must all be determined in order to establish whether there is, in fact, a sufficient margin of safety.

In the next section, we discuss several basic criticisms of the Interim Criteria. In the section following, a number of grave deficiencies in the computer codes are analyzed.

III. CRITICISMS OF THE INTERIM CRITERIA

Page 6—"[Fuel rod] rupture occurs when the hoop stress resulting from the fission gas pressure exceeds the strength of the cladding. Considerable swelling (plastic deformation) of the rods may occur prior to rupture and reduce the passage for the emergency coolant through portions of the core. Flow blockages can be hypothesized which would result in transient termination being seriously delayed, increasing the probability of embrittlement and subsequent disintegration and/or melting of the cladding and fuel."—P. L. Rittenhouse and R. A. Dean, "Preface: Symposium on Fuel Rod Failure and Its Effects," *Nuclear Technology*, XI, 4, p. 473 (August 1971).

"The Zircaloy-clad fuel rods of a light-water reactor will deform by swelling during the thermal transient associated with a loss-of-coolant accident (LOCA). This swelling may cause coolant channel blockage of such magnitude that emergency cooling may be impaired."—R. D. Waddell, Jr., "Measurement of Light-Water Reactor Coolant Channel Reduction Arising from Cladding Deformation During a Loss-of-Coolant Accident," *Nuclear Technology*, XI, 4, p. 491 (August 1971).

The natural course of a loss-of-coolant accident can be halted if adequate emergency cooling of the core can be initiated within the time (a fraction of a minute) before the irreversible event of core meltdown has begun. Such irreversible events are started when alterations in core geometry prevent or substantially constrict coolant flow through a major portion of the core, especially around a core hot-spot, or when temperature excursions have initiated abundant metal-water or metal-steam reactions. Severe coolant flow reduction, from any cause, may induce (page 7) such excursions. It is known that appreciable metal-steam/water reactions, once started, can generate large quantities of heat and sufficient pressure to rupture or burst reactor containment vessels. Metal-water reactions may very likely follow on the heels of major coolant flow restrictions and can be considered as successive aspects of the development of a single accident, one causing the other.

Emergency core-cooling system performance in a loss-of-coolant accident would be considered successful if the values of the relevant variables were kept below the thresholds defining the onset of the irreversible event of core meltdown. To set trustworthy design criteria for an adequate emergency core-cooling system, therefore, is to *specify* precisely the *known* threshold values for the key variables, augmented, perhaps, by a so-called margin of safety. Therefore, design criteria are to be evaluated in terms of both how determinate and how warranted are the limits they incorporate. Moreover, the design criteria covering different variables should be internally consistent. Thus, insofar as the extent of metal-water reactions and the alteration of core geometry are dependent on cladding temperature, the standard for maximum cladding temperature should be such that it is consistent with an adequately small metal-water reaction limit and with keeping core geometry in a configuration amenable to cooling.

In terms of requisite specificity, items 1 and 2 of the Interim Criteria (page 4), which actually specify numerical values for maximum fuel element cladding temperature and the permissible extensiveness of metal-water reactions, and item 4, for which a numerical value can be readily computed for any specific reactor, are obviously satisfactory. (In other respects, as we shall see later, they are *not* satisfactory.) Item 3, however, relating to core geometry, is quite unsatisfactory in that neither quantitative nor detailed qualitative specification is given. Since the *kind* of altered core geometries that are still amenable to cooling by emergency core-cooling system operation are not specified in item 3, the requirement that "the clad temperature transient is terminated at a time when the core geometry is still amenable to cooling" (page 8) is operationally vague and meaningless. Until the specifications, which should be established by a suitable experimental program, for such unorthodox but acceptable geometries are provided as part of the design criteria by the Commission, conformance with this part of the Interim Criteria cannot be ascertained.

The vagueness of the Interim Criteria, item 3, with respect to core geometry, is explained by the fact that basic research on the susceptibility of altered core geometries to cooling, and on what core geometry changes are induced during a loss-of-coolant accident, irrespective of their effects on cooling, has only recently started. No adequate fraction of the program has been completed. Although some preliminary theoretical calculations indicate that coolant flow restrictions of up to 90% (which could be brought about by known swelling of fuel rods) may have no deleterious effect on emergency cooling adequacy, there are other engineering reports that appear to contradict this. Moreover, the predictions themselves are of uncertain validity. Tests of adequate scope (involving flow resistance in distorted core geometries) to settle this important question have not been carried out, but like many other tests, are planned. It is absolutely clear that coolant flow restrictions approaching 100% cannot be tolerated and there is insufficient assurance, again resulting from lack of tests of adequate scope, that core damage in an accident will not lead to nearly total flow restrictions in a large enough portion of a reactor core so that a major accident cannot be prevented.

One of the Oak Ridge National Laboratory's principal investigators of changing core geometry during a loss-of-coolant accident, R. D. Waddell, Jr., summarized the state of knowledge with regard to the possibility of cooling altered core geometries when he flatly stated: "It would be presumptuous at this time to predict what level of coolant area reduction could be tolerated in a LOCA (loss-of-coolant accident)." (Waddell, *op. cit.*, p. 501.)

Page 9—In addition to the indeterminateness of item 3 of the Interim Criteria covering core geometry, owing to the basic lack of knowledge in this area, item 3 is also inconsistent with item 1 of the Interim Criteria: the specification of maximum allowable fuel cladding temperature (2300° F). *Two recent experiments indicate that gross clad swelling and even rupture can take place at temperatures very much less than 2300° F. Both swelling and rupture represent irreversible changes in core geometry that could lead to complete care meltdown.* Inasmuch as the Interim Criteria, for want of basic knowledge in the area, cannot specify which altered core geometries are amenable to cooling, the Criteria must presume that the value placed on the temperature determinant of core geometrical changes will be consistent with preserving essential core geometry. This assumption is strongly challenged by the results of empirical investigations conducted at the Oak Ridge National Laboratory and at the National Reactor Testing Facility (Idaho). The remainder of this chapter is a presentation and discussion of these experimental results and their implications for the adequacy of the Interim Criteria. (It should be noted that these experiments had been completed before the Interim Criteria were promulgated by the Commission.)

The first indication of the frailties of the Interim Criteria comes from a single test of fuel rod failures in a simulated loss-of-coolant accident, carried out at the Oak Ridge National Laboratory. The report on these tests is entitled *Final Report on the First Fuel Rod Failure Transient Test of a Zircaloy-Clad Fuel Rod Cluster in TREAT*, by R. Lorenz, D. Hobson, and G. Parker, Oak Ridge National Laboratory (ORNL–4635), March 1971.

The Oak Ridge test employed a small special test reactor (called TREAT) using fuel rods pressurized with helium to simulate the buildup of fission gas normal in partially

expended fuel elements. The rods were exposed to steam flow, simulating conditions after the blowdown portion of an accident. Residual fission-product heating, characteristic of a real accident, was simulated by fission heat generation only until the cladding reached a predetermined temperature and then was intentionally (page 10) terminated. In a real accident the residual heating does *not* terminate in this manner but continues to diminish only slowly with time. The test reactor was operated at steady power for 28 seconds so as to bring the maximum measured fuel cladding temperatures to 1770° F. At this time reactivity and hence heat generation was set to diminish and was entirely halted two seconds later. Simulation of an accident was thus stopped at this time. (As we have said, in a real accident, fission product heating would continue, not subject to control.) Fuel rod ruptures had by then become extensive. *All* fuel elements were swollen and bowed. One of the elements, previously irradiated in another reactor in an amount equivalent to a few percent of its normal fuel burnup, ruptured, releasing parts of its uranium dioxide fuel and fission products into the core and steam. Its failure initiated what appears to have been the start of an *unexpected, propagating, fuel-element failure mode.* Hydrogen generated by Zirconium-steam reactions was identified. *In the words of the report, "The Zircaloy cladding swelled and ruptured resulting in a 48% blockage of the bundle coolant channel area at the location of maximum swelling. ."— ". . . examination revealed ductile ruptures and significant oxygen pickup".* The relevance of these results comes from the fact that *the test "was conducted under the most realistic loss-of-coolant accident conditions of any experiment to date."* The investigators found that fuel rod ruptures were close together and concluded, "This indicates a high sensitivity to temperature . . ." This sensitivity is verified in other tests carried out by R. D. Waddell, Jr., at Oak Ridge.

One wonders what would occur in an accident that developed a cladding temperature of 2300° F (500° F greater than in this test), the temperature excursion generally expected in a major accident and acceptable under the Interim Criteria.

It has been established by this test and other data (see BMI–1877) that fuel elements pressurized to 300 psi by fission gases are near their ultimate strength when at somewhat above 1600° F and that rapid fuel rod swelling begins at this temperature. Rupture, as the Oak Ridge test shows, will occur before 1800° F. At lower pressures the situation is worse: tube swelling is more uniform and greater channel blockage occurs before tube rupture terminates swelling.

The Interim Criteria allow the computed fuel cladding temperature excursions in an assumed loss-of-coolant accident to reach 2300° F. We consider this to be excessively high. One consequence of this high temperature, independent of the effects we have just discussed, is the likely possibility of metallurgical reactions that can cause damage to a core and to its containment vessels so severe as to itself constitute the beginnings of uncontrolled meltdown. The second of the recent experiments on reactor accidents sheds light on this issue. Tests Zr–3, Zr–4, and Zr–5 were devised and run by the Idaho Nuclear Corporation (INC)—Idaho Nuclear Corporation has, subsequent to the reports referred to in this report, become the Aerojet Nuclear Corporation—under contract with the Atomic Energy Commission to determine the response of Zircaloy–2 fuel cladding to emergency core-cooling conditions: subjecting the fuel cladding to a temperature cycle in the presence of steam. The results are recent and are reported in an INC document: M. J. Graber, W. E. Zelensky, and R. E. Schmunk, *A Metallurgical Evaluation of Simulated BWR Emergency Core-Cooling Tests* (IN–1453), February 1971.

Twelve foot long bundles of 49 electrically heated simulated fuel rods were employed. Alumina was used as a filler in the zirconium rods in place of the usual uranium dioxide fuel, with rod spacing maintained by Inconel springs. Such springs are commonly used in large reactors; alumina is not. Electrical heating was used to bring the rods to temperatures somewhat above 2100° F. The authors observed "unexpected temperature excursions up to 2940° F." It was apparent that ". . . liquid-metal steam reaction produced temperature excursions." "Post-test examination of the bundles shows extensive cladding damage, confirming the high-temperature indications." "Photographs show . . . the serious cladding degradation which existed after each of the three tests." "The areas of damage show the white color typical of severe oxidation of Zirconium, considerable fragmentation, and some fusing together of the cladding on a rod-to-rod basis." There was "extensive cladding damage" in all three tests. The tubes "were attacked by the steam" and substantial embrittlement occurred. Chromium and nickel in the Inconel alloy attacked the cladding at points of contact. According to the authors, ". . . viewing of the tubes . . . revealed various degrees of destruction at . . . spring locations. It appears that the eutectic melting between the 'lantern springs' and the Zircaloy was one method of tube perforation which lead (sic) to the Zr-Al liquid-metal reaction with steam." These test results do not lead to an optimistic view of the emergency core-cooling systems that meet the Interim Criteria. 'Lantern springs' are employed in large reactors and can provide an unexpected cause of fuel rod rupture and metal-water reactions at unfortunately and unexpectedly low temperatures. The authors of IN–1453 somewhat differently remark: "The fact that metallurgical performance anomalies such as the alumina-zirconium incompatibility can occur raises the question of what might happen in an actual ECC [Emergency Core-Cooling] situation." And indeed it does. They go on to suggest that the irradiated uranium dioxide fuel pellets could react with the Zirconium of the cladding causing a phenomenon similar to that observed in the tests Zr–3, Zr–4, and Zr–5. The suggestion has not been further explored. They conclude by saying, "Another possibility is that tube perforation, resulting from eutectic melting caused by the lantern springs or resulting from other causes, would allow steam to come in contact with the uranium dioxide (UO_2). The UO_2 may be converted to U_3O_8 which would thermodynamically be expected to react with the Zircaloy. These possibilities bear further investigation during future work." In fact, if these possibilities are at all probable, the "further investigations" these authors suggest become of substantial importance.

Now the Oak Ridge test did not include a simulation of continuing fission product heating as heat generation was intentionally terminated at the relatively low temperature of 1800° F. before the onset of substantial metal-water reactions. The conditions of the second test were arranged to develop initial temperatures of from 2100° F to no more than 2200° F. It too did not simulate continued fission product heating and the unconstrained temperature rises that might be consequent on core damage and coolant flow constrictions in a large reactor accident. Even so we must emphasize that large and unpredicted temperature spikes occurred. Accordingly, one must infer from the results of both tests the likely course of an accident.

Page 13—The implications of these two test programs taken together are that as a core heats above 1600° F, during the depressurization (or blowdown) phase of a loss-of-coolant accident, extensive fuel rod swelling starts, with consequent restriction of the coolant flow channels. At 1800° F one expects coolant channels to be between 50% and 100% blocked, depending on the internal pressure of the individual rods, and extensive fuel element rupture to have occurred. At this temperature some melting of fuel cladding and tubing perforation may have begun at or near rod supports or spacers if they contain nickel. The zirconium-nickel eutectic melts at 1760° F, and the resulting molten metal will react chemically with steam releasing damaging heat. The extent of metal-water reactions is computed, for the purpose of determining conformance with criteria no. 2 (page 4), using *only* knowledge of Zircaloy-water reactions, whose onset is at temperatures much above 1760° F. As the temperature continues to increase toward 2300° F, with impeded coolant flow (and the emergency core-cooling code results suggest that the temperature *will* rise close to this value, even with *unimpeded* coolant flow) it is a reasonable, and indeed likely, conclusion that unexpected cladding and fuel reactions with steam will develop sharp temperature spikes, enhanced clad melting, further fuel rod perforation, and add extensively to the core damage. Most of these phenomena occur through mechanisms not considered in the application of the Criteria. Possibly, the recently discovered propagating fuel element failures would cause even more rapid and widespread core destruction than we can now foresee. Substantial fission product release will have occurred into the containment. It should be recognized that these are the last developments that precede uncontrolled core meltdown. It appears possible, although not certain, that the development of an accident in a large, badly damaged reactor core at 2300° F could not be arrested, and that at this temperature emergency core-cooling water would then serve only to aggravate the accident.

G.O. Bright, manager of the Water Reactor Safety Program at the National Reactor Test Site (in *Nuclear Safety* Vol. 12, September-October 1971) remarks that "Assurance is needed that a localized fuel failure will not propagate over a significantly large portion of the core. The (page 14) assessment of the design safety margins for such accidents requires better information on fuel limits, failure damage, and the conditions that might lead to failure propagation."

According to the Interim Criteria, the 2300° F cladding temperature limit has been "chosen on the basis of available data on embrittlement and possible subsequent shattering of the cladding." It is wholly inappropriate to base the maximum allowed cladding temperature on considerations of embrittlement, if the onset of extensive core damage and coolant channel constrictions can occur at a lower temperature. It is clear how critically important it becomes to ensure an undisturbed flow of coolant at low enough temperatures so there is no possibility of metal-water reactions. Selection of the maximum calculated temperature must reflect this requirement.

In addition to coolant flow interference from mechanisms related to temperature transients and metallurgical phenomena, there are other mechanisms that might alter core geometry during a loss-of-coolant accident. The loss of primary coolant, with attendant shock waves and water-hammer effects, could well be a brusque and destructive event, with violent coolant flow conditions that a reactor core may be unable to withstand. In addition to shock wave and water-hammer damage to the core in an accident there is also a presumption that thermal shock to the fuel rods from contact with emergency core coolant may also prove highly damaging. The Interim Criteria fail to consider all such mechanisms that might render the coolant flow ineffective. Indeed,

owing to the serious shortcomings of the reactor safety research program, little is known about the magnitude and consequences of destructive forces and abrupt cooling on the core; by omission, the Interim Policy Statement makes the wholly unjustified asumption that they do not matter.

G. O. Bright, in discussing blowdown and emergency core coolant delivery (previous citation), writes with respect to a loss-of-coolant accident: "The present need in this area is to establish the accuracy of the methods used to predict temperature excursions taking into consideration conditions in which bypass flow and other effects may reduce the design ECC flow rates to the core." This is hardly a reassuring statement in view of the neglect of these effects in the applications of the Interim Criteria.

The Interim Criteria, contrary to strong experimental evidence, allow the use of computer codes which assume that uninhibited emergency coolant flow will persist through an essentially unchanged core geometry. Moreover, the Criteria permit cladding temperatures below which, experiments indicate, core damage and substantial metallurgical reactions can occure. It is these Criteria that have recently been applied to large power reactors that are being constructed ever closer to populated areas. It is clear to us that the Criteria offer little assurance of public safety in the event of a loss-of-coolant accident. A maximum permitted cladding temperature of 2300° F is excessive. Experimental evidence indicates that 1600° F is the threshold temperature above which core geometry alters increasingly rapidly and cladding rupture may take place. Inasmuch as the altered geometry may be inconsistent with effective emergency core-cooling system operation, a much lower peak clad temperature than 2300° F should be set. Metal-water reactions, involving eutectic alloys, are not considered and they, too, are important at temperatures below 2300° F. This lower peak clad temperature, which should be determined by a suitable experimental program, should be substituted for the 2300° F limit allowable under the Interim Criteria. Inasmuch as little data is available pertaining to the kinds of altered core geometries still amenable to cooling, conservative design criteria should be set specifying a peak clad temperature that is the threshold defining *any* major geometrical alterations in the core.

IV. CRITICISMS OF THE COMPUTER CODES

Page 16—"A lion tamer must not let the beasts frighten him. All a computer does is tell a consistent story: a consistent truth or, if the programmer's guesses are unlucky, a consistent fiction. Computers as a group speak with forked tongue—each one tells a different consistent story."—Paul A. Samuelson, Professor of Economics, M.I.T.

Full and unequivocal confidence in the successful operation of reactor safety systems can come only after the completion of a major program of engineering research and study, including closely controlled, large scale, "near-real" accident simulations. Such a program has not been carried out. There is presently available only an exceptionally thin base of engineering experience with emergency core-cooling system behavior. None of the engineering studies have been conducted to date under "near-real" conditions. Moreover, studies have been dominantly directed toward fragments and pieces of the whole problem. We have seen this in the two experiments discussed in the preceding section. The recent technical literature contains other examples. In *Nuclear Technology* (August 1971) there is a report on experiments on fuel rod expansion during sudden heating. The authors qualify the general relevance of their investigations by noting:

"Interest in the degrees of strain experienced by the cladding [during a loss-of-coolant accident] focusses on the objective that deformations will not be so extensive as to prevent residual heat removal after cooling is nominally restored. The data presented here are not intended to answer the question directly and generally."

One can search elsewhere as well and not find the question answered "directly and generally." Other observations, from the recent literature, on the limits of present engineering knowledge of emergency core-cooling system behavior are noted in this section.

Page 17—Mathematical models of safety system operation can be constructed and their input assumptions, methods, and predictions verified by comparison with experimentally derived data. Such models permit the synthesizing and manipulation of known data and hypotheses concerning reactor accident phenomena and can facilitate development of quantitative analysis of safety system operation during accident situations. Minor gaps in experimental knowledge can, in principle, be filled using these models. The use of mathematical models may be necessary when, for example, full test realism is too hazardous or when acquisition of engineering knowledge is unhappily delayed.

It is absolutely clear, however, that mathematical models cannot be used reliably to span large gaps in engineering knowledge, owing to the very great uncertainties that accumulate in long and unverified chains of inference. The quality of the mathematical simulation is influenced in a vital way by the extent to which the modeling procedure has been based upon experimentally warranted assumptions and parameters and confirmed by suitable tests. Without presently missing engineering experience it is difficult, if not in fact impossible, to determine whether these models are truly accurate and useful. The lack of critical data is likely to lead to elegant but empty theorizing. It is, however, possible to determine if obvious weaknesses exist in a code that reduce or eliminate confidence in its application.

Accordingly, experimental confirmation of the accuracy of the codes is a compelling prerequisite for their use in determining the suitability of nuclear power plants for safe operation.

The Atomic Energy Commission, nevertheless, has taken the position that certain mathematical models may be used to span the very substantial gap between the meager conclusions one can draw from available experimental information and credible assurance of the satisfactory performance of untested emergency cooling systems. The AEC placed its reliance on the predictive capabilities of mathematical models embodied in computer codes being developed by its own researchers and by reactor manufacturers. Such codes were recommended in the Interim Policy Statement (page 18) of June 29, 1971, to determine a nuclear power reactor's expected behavior during a loss-of-coolant accident in order to assess its conformance with the Interim Criteria for emergency core-cooling system performance. We discuss these mathematical models in this section.

A reliable estimation of the expected performance of the emergency core-cooling system during a loss-of-coolant accident in a large reactor would require a most sophisticated mathematical model together with the resources of a very large computer. It is likely that no modern computer is of adequate size. This mathematical model, embodied in a computer program, or *code*, would have to simulate accurately the complex phenomena expected to occur in a loss-of-coolant accident: the dynamic conditions and directions of coolant flow throughout the primary loop, and especially in the vicinity of the core hot-spots; the cooling provided by exiting primary coolant; the heat transfer conditions that will occur at various stages of the accident; the core geometry changes—fuel rod perforations, swelling, and bowling, and possible subsequent flow blockages, core fragmentation, propagating fuel element failures, steam expansion, and chemical reactions between fuel and cladding; Zircaloy-water reactions; the time required to bring the pumps for the emergency coolant to speed and the effect of vessel pressure on pump performance; Leidenfrost migration of the emergency coolant; and other phenomena. To construct a code that would do all this reliably is *entirely beyond the present capabilities* of engineering science. Feasible computer programs that attempt to represent these events will be forced to make very substantial compromises in their description of events because of the complexity of the mathematics and uncertainty in, or total lack of, important engineering data. Many of the phenomena listed above must be omitted or only approximately described. To limit the scale and complexity to manageable proportions, approximations will have to be made. The validity of the models—their ability to make reliable predictions about the consequences of a loss-of-coolant accident—will be deeply affected by these mathematical simplifications, computational approximations, and by neglect or oversimplified treatment of many processes (page 19) that are expected to be important, or whose importance is not presently recognized.

There is abundant evidence that the computer codes presently in use are insufficiently refined, from a mathematical point of view, inadequately tested in a suitable experimental program, and embody unsatisfactory simplifications of the real situations. They cannot provide any reasonable bases for predicting the performance of presently designed emergency core-cooling systems during loss-of-coolant accidents. We present in this chapter several basic criticisms of the computer codes recommended in Appendix A, parts 1–3, of the Interim Policy Statement of June 29, 1971, for use in the assessment of emergency core-cooling system expected performance. In presenting these criticisms, we do not wish to belittle the talent and energy that has been expended in code development; we present these criticisms with considerable regard for these efforts and with an appreciation of the substantial difficulties faced by code developers. Nevertheless, for at least the reasons enumerated and documented below, we believe that the available computer codes do not yet approach the stage of development wherein they could be used to adequately describe the phenomena associated with a loss-of-coolant accident in an assuredly realistic way and to confirm convincingly the adequacy of presently designed emergency core-cooling systems.

Our specific criticisms of the codes are:

1. All of the recommended computer codes assume that there are no major—some codes assume, however, a change in the gap between cladding and fuel—changes in core geometry during the course of a loss-of-coolant accident. In the light of the extensive experimental evidence presented in the preceding chapter, this assumption of constant fuel rod and core geometry is almost certainly wrong. It is apparent that code results based on this incorrect assumption cannot be accepted as valid.

Predictions made at Oak Ridge National Laboratory of the reduction of coolant channel flow, based on tubing expansion data, indicate that the reduction will be 100%, or coolant flow totally blocked, under certain conditions. It should not prove difficult to confirm that no reactor in a loss-of-coolant accident could tolerate this zero flow. (Page 20) Happily, experiments and predictions are not in agreement, owing to deficiencies in the model, although reductions approaching 90% have been observed in multi-rod experiments at Oak Ridge. Tests have so far not been carried out for initial pressures

above 400 p.s.i., although such tests are especially relevant for pressurized water reactor fuel elements. The missing tests are planned.

2. In assuming that there are no major changes in core geometry during a loss-of-coolant accident, the computer codes beg the question of the emergency core-cooling system's capability to maintain core geometry in a coolable configuration. The codes are not capable, therefore, of determining conformance with item 3 of the Interim Criteria (page 4).

3. No adequate experimental confirmation of the accuracy of the codes has been carried out under realistic loss-of-coolant accident conditions.

4. Parameters in the computer codes used to analyze emergency core-cooling systems are of necessity speculative and to some extent arbitrary, owing to an extensive lack of experimental data on various aspects of a loss-of-coolant accident. Since the nature and sequence of events during a loss-of-coolant accident as represented by the codes have not been established by definitive experiments—as a specific example, Idaho Nuclear Corporation researchers state in document IN–1389, "During a loss-of-coolant accident the Zircaloy cladding will be subjected to forces that are largely undefined at this time. . . ."—the codes' scenarios for loss-of-coolant accident phenomena are largely products of conjecture. Accordingly, tenuous chains of inference and not well-established facts determine the computer codes' simulations of loss-of-coolant accidents.

Two quite recent examples illustrate just how uncertain modeling can be that is based on assumptions neither tested nor otherwise tied to experimental evidence. They are taken from the Supplement to the Safety Evaluation by the Division of Reactor Licensing, US AEC, in the matter of Vermont Yankee Nuclear Power Station (July 19, 1971). In connection with core spray effectiveness during an assumed loss-of-coolant accident, (page 21) General Electric and Idaho Nuclear Corporation (INC) developed independent models appropriate to the situation. The supplement says, "GE uses a correlation based on theoretical analysis to calculate the time to quench. INC estimates the quench time from available data and predicts significantly longer times to quench. The net result of this difference is that in cases of interest, INC predicts peak clad temperatures which are 10% to 15% higher than those predicted by GE." It should be noted that differences as large as these can determine whether a reactor accident is brought under control or develops into an incalculable tragedy. In this example the AEC did not permit GE to use its theoretically predicted quench times without correction.

In another portion of the GE analysis "a value of 0.6 was used for the emissivity of both stainless steel rods and channel box. Subsequent tests made to measure the emissivity of stainless steel bundles indicated that a value of 0.9 would be appropriate. The consequences of the error brought to light by the measurements were such that the AEC required the analysis to be repeated with the correct emissivity. In each of these examples, the error consequent on the use of insufficiently verified conjecture was such as to overestimate the effectiveness of a reactor safety system."

For detailed documentation of the extensive gaps in our experimentally derived understanding of reactor accident phenomena and of the performance capabilities of emergency systems, refer to:

(a) C. G. Lawson, Emergency Core-Cooling Systems for Light-Water-Cooled Power Reactors, Oak Ridge National Laboratory, ORNL–NSIC–24, 1968.

(b) US AEC, Water-Reactor Safety Program Plan, WASH–1146, February, 1970.

(c) Committee on Reactor Safety Technology (CREST), European Nuclear Energy Agency, Water-Cooled Reactor Safety, OECD, Paris, May 1970.

(d) Ian A. Forbes, Daniel F. Ford, Henry W. Kendall, and James J. MacKenzie, Nuclear Reactor Safety: An Evaluation of New Evidence, Cambridge, Mass., The Union of Concerned Scientists, July 1971; reprinted in Nuclear News, September 1971.

(e) *Nuclear Technology*, August 1971—an issue partially devoted to a symposium on fuel rod failure and its effects.

(f) *Nuclear Safety*, September–October, 1971—especially the articles by G. O. Bright and P. L. Rittenhouse.

5. The suggested codes, from a formal mathematical point of view, are presently inadequate as devices to simulate the dynamic conditions of a loss-of-coolant accident. As the Idaho Nuclear Corporation noted in presenting its report on one of the codes whose use was recommended in the Interim Policy Statement, THETA 1–B

"The fluid dynamic and heat transfer processes occurring in a nuclear reactor core during a loss-of-coolant accident are extremely complex. To accurately determine the response of the fuel rods, the complete set of conservation equations must be solved in detail throughout the primary system. Currently a code of sufficient complexity does not exist." (IN–1445, February 1971, p. 1.)

6. The recommended codes (e.g., THETA 1–B, RELAP 3, etc.) are in a very early state of development and, as indicated by their developers, are inappropriate to the task of evaluating the reliability of the emergency core-cooling systems in connection with reactor licensing. The Interim Policy Statement places the responsibility for determining emergency core-cooling system adequacy on codes that represent heuristic development efforts in the field of accident evaluation rather than finished and refined analytical tools whose accuracy has been convincingly confirmed by engineering data. As the authors of THETA 1–B affirm:

"The code was designed more as a development tool than as a production code." (IN–1445, February 1971, p. 2.)

A similar qualification of the use of the recommended computer codes was given by the developers of RELAP 3:

"The RELAP 3 program is being released, not as a final product, but as a current method for investigating the transients expected in pressurized water reactor accidents. Modifications currently planned to improve and extend the area of usefulness of the calculations will be included in the next version of the RELAP computer code." (IN–1321, June 1970, p. 1.)

Page 23—7. Despite indications that nonuniform (i.e., radial) coolant flow distributions during the blowdown and emergency core coolant injection phases of a loss-of-coolant accident could pose a cooling problem of great seriousness, the recommended computer codes do not simulate such flow patterns.

(a) Although pressure is expected to be significantly greater around the core hot-spot than elsewhere, THETA 1–B makes the simplifying assumption, typical of all the codes, that average core pressure as computed by RELAP 3 exists at the core hot-spot. ("Since THETA 1–B solves only the fluid energy equation and not the coupled set of equations for the fluid, several simplifying assumptions are required. The pressure and mass flux are assumed to be uniform through the channel at any instant in time. The average core pressure as computed by RELAP 3 was used as the pressure in the fluid channel."—IN–1445, p. 36)

(b) Although steam expansion and Leidenfrost migration and attendant radial flow and coolant-problems during a loss-of-coolant accident have been noted ("Calculations indicate that this problem [radial flow] may cancel the margin of safety previously thought to exist in emergency core cooling systems."—IN–1387, p. iii), no attempt has been made to include such factors in the codes to be used to analyze emergency core-cooling system performance.

8. Semiscale test results are used in code development and in checking existing codes, even though the Atomic Energy Commission, in response to the failure of the simulated emergency core-cooling system in the recent Idaho semiscale tests, has stated that semiscale mockups were very inadequate simulations of commercial-size power reactors.

The use of semiscale test results in code assessment and development was affirmed by the Idaho Nuclear Corporation in its preliminary report *Semiscale Test 845 Through 851*, June 29, 1971, p. I–1:

Page 24—"The purpose of the project [Semiscale Blowdown and Emergency Core Cooling (ECC)] is to obtain experimental information regarding the hydraulic, thermodynamic and mechanical behavior processes which are expected to be characteristic of a reactor system during a loss-of-coolant accident (LOCA). The information is to be used for developing and evaluating analytical models and codes for reactor safety assessment and for support and guidance of the LOFT Integral Test Program."

The Atomic Energy Commission's position on the relevance of the semiscale test data to determination of emergency core-cooling system reliability on commercial-size reactors was expressed in the AEC News Release of May 27, 1971:

"The recent small mockup tests at NRTS were not designed to represent the response of an actual operating nuclear power plant to a loss of coolant accident. There were significant differences in the experimental system which was tested as compared to an operating reactor."

Science reported that AEC Director of Reactor Development and Technology, Milton Shaw, "insists these findings [Idaho Semiscale Test results] have little direct bearing on the safety of nuclear reactors" (May 28, 1971, pp. 919–919).

One disturbing feature of any attempt to study the quality (or lack of it) in safety system performance is that a number of computer codes, developed by reactor manufacturers to analyze the performance of their systems during accident conditions, are not available for public examination. The vendors consider these codes to be proprietary information. Sufficient public data has been provided on the assumptions employed in the codes, and on the basic equations they incorporate, so that we have been able to conduct a partial review of the code's structures and adequacies. We have concluded that the proprietary codes are no more acceptable than those in the public domain. We believe it is very wrong to conceal even partially from public view material which so evidently affects the public health and safety and especially so since there is a deep suspicion of its adequacy.

In summary, we have concluded that the gaps in engineering knowledge of safety system performance are simply too great to be bridged adequately by present mathematical models. It is clear that the models endorsed (page 25) under the Interim Criteria for confidently demonstrating reactor safety-system acceptability when measured by the scale of the critical function they are asked to perform are *highly inadequate*.

V. CONCLUSIONS AND RECOMMENDATIONS

Page 26. The evidence of grave weakness in many independent aspects of the Interim Criteria is so abundant and convincing that in our opinion virtually no portion of the Criteria can contribute usefully to a positive assurance of reactor safety in the event of a loss-of-coolant accident. On the basis of our study and review of the Criteria and of related engineering material, we state the fol-

lowing basic criticisms of the Interim Policy Statement:

1. The maximum cladding temperature of 2300° F is excessive. Evidence from the fuel-rod failure tests in TREAT, the most realistic simulation of the loss-of-coolant accident conditions to date, indicate that 1600° F is the threshold above which core geometry begins to alter. Inasmuch as the altered geometry may be inconsistent with effective emergency core-cooling system operation, a much lower peak clad temperature based on experimentally determined threshold temperatures for core geometry alterations should be substituted for the 2300° F allowable under the Interim Criteria.

2. Since the kind of altered core geometries that are still amenable to cooling by emergency core-cooling system operation are not specified in the Interim Policy Statement, the requirement that "the clad temperature transient is terminated at a time when the core geometry is still amenable to cooling" is operationally vague and meaningless. Until the specifications, which should be established by suitable experiments, for such coolable geometries are provided by the Commission, conformance with this part of the Interim Criteria cannot be ascertained.

3. The computer codes recommended in the Interim Policy Statement for analyzing emergency core-cooling system performance capabilities assume that there are no major changes in core geometry during the course of a loss-of-coolant accident. This assumption is in conflict with clear experimental indications of such changes in core geometry during a loss-of-coolant accident. This assumption, moreover, begs the question of an emergency core-cooling system's capability to maintain core geometry in a coolable configuration.

Page 27—4. Some of the parameters used in the computer codes suggested in the Interim Policy Statement for use in the analysis of emergency core-cooling system performance are approximate and arbitrary, owing to an extensive lack of experimental data on the nature and sequence of major events during a loss-of-coolant accident.

5. No adequate experimental confirmation of the accuracy of the codes has been carried out under realistic loss-of-coolant accident conditions.

6. The suggested codes are in an early state of development and the nature of the initial assumptions, compromises forced by the complexity of the mathematical model, etc., are such that they can only be regarded as development efforts in the field of accident evaluation rather than as finished and refined analytical tools whose accuracy has been convincingly confirmed and which can be used to reliably simulate the dynamic conditions of a loss-of-coolant accident. We find the use of the codes, as they are presently constituted, to be *entirely without merit* as the primary means of determining whether or not the emergency core-cooling system is satisfactory.

7. Experimental knowledge of metal-water reactions, including eutectic alloys, indicates that the predictions of Zircaloy-water reactions alone, as employed to conform to Criteria No. 2, greatly underestimate the extent to which metal-water reactions may occur, for temperatures much below 2300° F.

8. Semiscale test results are used in code development and for checking existing codes, even though the Atomic Energy Commission, in response to the failure of the simulated tests, has stated that the semiscale mockups were very inadequate simulations of commercial-size power reactors. Despite this view on the dissimilarity of semiscale and commercial-size reactors, computer codes based on semiscale system data are recommended for use in analyzing commercial-size power reactor emergency core-cooling systems.

9. Despite indications that non-uniform coolant flow distributions within the core during blowdown and emergency core-coolant injection may cancel the margin of safety previously thought to exist in emergency core-cooling systems, the (page 28) recommended computer codes do not simulate such radial flow. For example, although pressure is expected to be significantly greater around the core hot-spot than elsewhere, THETA 1–B makes the simplifying assumption that average core pressure as computed by RELAP 3 exists at the core hot-spot.

We note with particular dismay that there are a number of reactors now operating which do not, and will not be expected for some years, to meet the Interim Criteria. This adds additional force to our second recommendation.

Reactor safety with respect to major accidents and consequent wide-spread damage and loss of life is in a very unsatisfactory state. The Interim Criteria make no adequate remedial contribution and can serve only to prolong public exposure to extreme risks over which there is inadequate control and which the Criteria gloss over with only the appearance and illusion of safety. The situation should not be allowed to persist.

The acute failings of the Interim Criteria that imply grave weaknesses in reactor safety assurance reflect a substantial abrogation by the Atomic Energy Commission of its major responsibility to ensure the public safety. It is apparent from this that the AEC cannot function effectively as the supporter and initiator of a major national program to "nuclearize" the country and, at the same time, have total responsibility for the most critical aspects of reactor safety. Our present study of the Interim Criteria emphasizes how important it is that the organization that directs the programs of reactor development shall *not* hold the major responsibility for developing and enforcing the criteria of safety. Moreover, the large number of reactors now operating or under construction and the weaknesses of the Interim Criteria make it urgent to effect the separation of the responsibility for reactor safety from the AEC as promptly as possible, so that, among other reasons, fully adequate criteria for reactor safety can be swiftly formulated. The alternative will be a highly undesirable increase of the hazard to which the American public is presently exposed. To determine how acute this hazard is and what steps must be taken to clarify and ameliorate it are matters of national concern and must also be promptly and clearly delineated. Corrective action of adequate scope can then be initiated without delay.

Accordingly, we recommend:

1. An immediate separation, from the Atomic Energy Commission, of the responsibility for determining criteria for all aspects of nuclear power reactor safety and for overseeing compliance with the criteria, including understanding and control both of planned and of unplanned releases of radioactive material. The responsibility must be assumed by an agency independent of the AEC.

2. Prompt initiation of a thorough technical and engineering study, by a qualified group, independent of the AEC, whose objective would be:

(a) To review the expected performance of emergency core-cooling systems installed in operating power reactors (a suggestion we made earlier);

(b) To determine the hazard to the public expected from the reactors now under construction or planned; and

(c) To develop the outline of an adequate program of engineering research and development that would clarify the nature and means of mitigating loss-of-coolant accidents, a program to have national support.

We wish to emphasize the continuing importance of the recommendation of our earlier paper: A total halt to the issuance of operating licenses for nuclear power reactors presently under construction, until safeguards of assured performance can be provided.

We are not alone in recommending removal from the AEC of authority to determine reactor safety standards. However, it is from consideration of the consequences of major reactor accidents and how the AEC has acted to prevent or mitigate such accidents that this recommendation gets its principal force. This and our earlier study illuminate clearly the magnitude of the risks of major accidents and the frailty of the safeguards against them. Adequate safety criteria based on secure knowledge have been lacking during the nearly fifteen years in which power reactor (page 30) construction has continued in the United States. The lack cannot be corrected too promptly.

RADIATION INVESTIGATION

Mr. GRAVEL. Mr. President, I was startled to learn that Dr. Eugene Saenger, who has been using terminal cancer patients to conduct human experiments for the Department of Defense, is a member of the National Council on Radiation Protection.

Surely it is high time to examine some of the ethical convictions of all members of the NCRP. After all, this is the group which has been recommending radiation guidelines of "permissible doses" for the whole public. Such recommendations in good measure are based on their personal value judgments of what risks, in terms of defective babies and early cancers, are "acceptable" for the public to bear in return for the alleged benefits of nuclear energy. The NCRP has steadfastly refused to reveal its death-and-deformity estimates which correspond to the permissible dose it recommended.

In addition to such an examination, I also recommend that support for Dr. Saenger's work be struck from this year's Department of Defense appropriaton bill, unless Dr. Saenger can absolutely satisfy Congress that there is no deceit or extra suffering or accelerated death involved for the unfortunate and helpless people he uses in his experiments. America must not drift into this kind of human experimentation. I commend the United Methodist Board for its position on this matter.

The grisly story of Dr. Saenger's work is told quite fully in Roger Rapoport's new book "The Great American Bomb Machine"—New York: Dutton.

Mr. Rapoport has provided me with a few hundred pages of additional documentation on this story, which I am happy to turn over to Senator KENNEDY'S Health Subcommittee.

These reports show that the National Academy of Sciences and the Atomic Energy Commission have been fully aware of Dr. Saenger's human experiments.

I plan to request the privilege of testifying before Senator KENNEDY'S subcommittee at a later date.

Parts of the Saenger story have been told in the Washington Post on October 8 and 9 in articles called, "Pentagon Has Contract To Test Radiation Effect on Humans," and "Kennedy To Investigate Radiation Test Project."

Mr. President, I ask unanimous consent to have both articles printed at the end of my remarks.

The PRESIDING OFFICER. Without objection, it is so ordered.

(See exhibit 1.)

SOME DETAILS OF THE EXPERIMENTS

Mr. GRAVEL. Other parts of the story were not told. From some of the Saenger's reports, I have tried to figure out what is really happening. I think I can document 18 points as follows:

First. "The physical condition of an overwhelming portion of the patients—has been such that they have been unable to undertake even the most simple of performance tests with any consistency. At times this has been due to difficulties with vision, use of hands, or total physical disability which precluded sitting up in bed. In other instances the low level of basic intellectual functioning of the patient has precluded adequate task performance"—1970: page 28.

Second. The ages of the case studies in Saenger's 1970 report are 78, 65, 57, 10, 53, 71, 80, and 62. One case appears to be omitted from the report—1970: pages 33–44.

Third. The patients, apparently charity cases in most instances, were presumably told that surgery would not help them—1970: page i.

Fourth. They also were told by Saenger and his collaborators that "there is a good chance we will reduce the size of their tumors and relieve some of their pain"—(Washington Post, October 8, 1971.

Fifth. However, they were not told that the whole body exposure to radiation would cause them considerable discomfort such as nausea and vomiting—(Washington Post, October 8, 1971—"Bomb Machine," chapter 5, 1967, page 115.

Sixth. Nor were the patients told that the Defense Department is buying the information about their reactions to the radiation exposure—"Bomb Machine," chapter 5; Washington Post, October 8, 1971.

Seventh, it is not clear whether or not the patients were told that the radiation "treatment" might accelerate their deaths—1967: page 115; Washington Post, October 8, 1971.

Eighth. These poorly educated people are given a rather abstract release to sign signifying that the "nature and purpose of this therapy, possible alternative methods of treatment, the risks involved, the possibility of complications and prognosis, have been fully explained to me. The special study and research nature of this treatment has been discussed with me and is understood by me—"Bomb Machine"—chapter 5.

Ninth. Patients who have agreed to the treatment are given personality and intelligence tests. "Although this instrument—the personality test—is designed to be self-administered by subjects whose educational level is equivalent to that of normal high school gradutes, we have found that meaningful data can be secured from patients with less schooling and/or intelligence by administering the questionnaire orally in an interview situation"—1970: page 18.

Tenth. The patients are "shammed," or given a sham irradiation treatment and observed, a day or two prior to real radiation exposure—1970: pages 33–40. "Anxiety was high prior to sham or actual treatment and decreased subsequently"—1967; page 116.

Eleventh. When time for radiation exposure comes, those patients who can sit up are seated "with legs raised and head tilted slightly forward"—1967: page 115.

Twelfth. Irradiation from a cobalt source lasts between 30 and 60 minutes—1967: page 118. The radiation therapist determines the dose, and sets it between 100 and 300 rads whole body or partial body exposure—1967: page 117.

Dr. Saenger poses the question, "What clinical effects would be different if the dose rates were much higher? Would the results differ if 200 RAD were administered in 1 minute or less?"—1967: page 118. It is thought that a healthy person has only a 50-percent chance of survival after an acute, whole body exposure to 300 RADS—"bomb machine," chapter 5.

Thirteenth. Immediately after the radiation exposure, the patients are given speech tests. "Except for those subjects where nausea intervened and they were not able to accomplish the verbal behavior test, the amount of radiation used in treatments does not seem to interfere with fluency of speech, except for the measure taken immediately posttreatment"—1970: page 32.

Fourteenth. Observers wait to see how soon the patient begins vomiting, and how long the vomiting lasts. At doses above 100 RADS whole body exposure, about one-third of "our patients" experience nausea and vomiting—1970: page 1. At doses between 150 and 200 RADS, about two-thirds of "our patients" vomit. Vomiting may start about an hour or two after irradiation, and "subside" 11 hours later—1970: page 36.

Fifteenth. In addition to speech tests, the "patients are subjected to other psychological tests in order to attempt evaluation of performance decrement following radiation"—1967: page 116. Dr. Saenger reports, however, that "it has been difficult to evaluate these studies, in part because of the low educational levels and intelligence quotients of these patients"—1967: page 116.

Sixteenth. Several physical measurements are taken too; apparently the Defense Department would like to find a way to determine a soldier's radiation dose from a biological measurement simple enough to be taken in the field—1970, pages 7, 32.

Seventeenth. Saenger reports that "psychic depression seemed to parallel changes in physical state" in the irradiated patients—1967, page 116. "As a total group, these patients show a peak of hopeful attitudes at day three, postradiation"—1970, page 27.

Eighteenth. Dr. Saenger's paper states in the introduction that "these studies were performed in conformation with the 'recommendations guiding doctors in clinical research as stated in the declaration of Helsinki of the World Medical Assocation—1964,' and that 'research was conducted according to the principles enunciated in the "Guide for Laboratory Animal Facilities and Care," ' prepared by the National Academy of Sciences-National Research Council"—1970, page i.

The sources referred to in the numbered paragraphs are as follows:

1967: Eugene L. Saenger, M.D., "Effects of Total- and Partial-Body Therapeutic Irradiation in Man," presented March 13–16, 1967, at the Lawrence Radiation Lab, and published by the AEC Division of Technical Information, CONF–670305.

1970: Eugene L. Saenger, M.D. et al, "Radiation Effects in Man: Manifestations and Therapeutic Efforts," October 1970, for the Defense Atomic Support Agency, publication DASA 2428.

1971: Roger Rapoport, "The Great American Bomb Machine," New York, E. P. Dutton, 1971.

EXPLANATION DUE FROM DR. SAENGER

Dr. Saenger claims that his experiments have two "equally important objectives"—letter April 19, 1971 to Roger Rapoport. These are to help the Defense Department plan for nuclear warfare, and to find out if whole-body or partial-body irradiation will help or "even cure" cancer patients.

If cancer therapy is one of the objectives, it would be of paramount importance to determine whether the "treatment" was beneficial or harmful to the patients. In medical research, extensive experimental animal trials precede human experiments, and careful control groups are required to observe the differences between those receiving a treatment, and those who are not.

Dr. Saenger should be called upon to show us what efforts he has made himself, or in collaboration without great cancer research institutes, to find out whether his unusual cancer "therapy" is helpful or harmful.

EXHIBIT 1

[From the Washington Post, Oct. 8, 1971]

PENTAGON HAS CONTRACT TO TEST RADIATION EFFECT ON HUMANS

(By Stuart Auerbach and Thomas O'Toole)

For the past 11 years, the Pentagon has had a contract with the University of Cincinnati to study the effects of atomic radiation on human beings. The prime purpose of the study, according to the contract, has been to "understand better the influence of radiation on combat effectiveness of troops."

To understand how irradiated troops might function on the battlefield, the University of Cincinnati has chosen to treat with radiation cancer patients who could no longer be helped by surgery. The patients were given the same kind of "total body" or "partial body" radiation that combat troops might expect to receive in an exchange of tactical nuclear weapons.

"It is my belief—my experience—that this is a helpful way of treating patients," said Dr. Eugene Saenger, the radiologist at the University of Cincinnati College of Medicine who heads the research project.

"We have never felt we have been doing these patients anything but good," he added in an interview.

But other experts in the use of radiation to treat cancer patients disagree. They said that with the exceptions of cancers such as Hodgkin's disease and leukemia, whole or partial body radiation is not an accepted means of treatment for cancer.

Instead, radiologists prefer to focus a high dose of radiation directly on the part of the body most affected by the disease.

This localized use of radiation prevents the large-scale killing of white blood cells—and the infection that generally follows—that accompanies total body radiation.

Whole body radiation is used in leukemia, however; because the cancer is in the white blood cells.

And new studies at the National Cancer Institute, to be reported on today by Dr. Ralph E. Johnson, show that the best treatment for

Hodgkin's disease includes radiation of all the lymph nodes—which are spread through most of the body.

With those exceptions, said Dr. Seymour Hopfam, a radiologist who specializes in the treatment of cancer patients at the Memorial Sloan Kettering Cancer Center in New York, "nobody to my knowledge is using this (whole body radiation) as a therapeutic measure.

"It approaches what happens in an atomic accident," he said.

The contract the University of Cincinnati has with the Pentagon's Defense Nuclear Agency (formerly the Defense Atomic Support Agency) has paid the university $850,000. This has been enough to buy study and treat 111 patients in 11 years.

All but three of the patients have been charity cases from Cincinnati General Hospital. Their average length of schooling has been six years, their average intelligence quotient a lower-than-average 86 (100 is average).

All were ill with tumors that had spread to other parts of the body. All were recruited for the whole body radiation treatments once they were told they could no longer be helped by surgery, drugs or selective radiation.

"We tell the patients we cannot guarantee our treatment will let them live any longer," said Dr. Edward B. Silberstein of Saenger's Cincinnati team. "We tell them there's a good chance we'll reduce the size of their tumors and relieve some of their pain. We tell them we'll visit them and follow their progress after they've been treated."

The patients are not told that the Pentagon is funding their treatment or that the prime purpose of the research which they are part of is to understand the battlefield effects of radiation.

"We do tell them that this research will be available in case somebody is irradiated on the battlefield." Silberstein said. "We use the battlefield analogy with every patient."

The patients also are not told that whole-body radiation will cause them considerable discomfort, such as nausea and vomiting. One reason they are not told this is that the Cincinnati team is trying to find out how much whole body radiation a combat soldier can take before he suffers nausea and vomiting.

"Nausea is a very subjective thing," Silberstein said. "If we told them in advance, it would bias our results."

Despite the fact that their research has been going on for 11 years, the Cincinnati group headed by Saenger has published little about it in the scientific literature. The only complete accounts of their work have appeared in their annual reports to the Pentagon.

One report entitled "Performance Decrements in Persons with Small Dose Radiation" ran in the Archives of General Psychiatry a year ago. A second study called "Biochemical Indicators of Radiation Injury in Man" appeared in a summary of a conference cosponsored by the World Health Organization earlier this year. Neither of the two reports discussed the benefits of whole-body radiation in cancer treatment.

"It's true we've not had a well-defined study comparing whole-body radiation to other forms of treatment," Saenger said.

Saenger said that his research project has been approved every year by the dean's committee on human research at the University of Cincinnati College of Medicine.

Dr. Evelyn Hess, the chairman of the dean's committee, said the medical school takes "extremely elaborate precautions" to make sure that any studies on humans follow guidelines set up by the National Academy of Science-National Research Council.

But she said she did not know that the studies were funded by the Pentagon's Defense Nuclear Agency. Nor, she said, did she know their purpose was to study the effects of radiation on combat troops—not to find better methods to treat cancer patients.

I don't know who funds the studies," she said in a telephone interview.

"That's not our purpose. We make sure the research is good and safe. Those are the main criteria."

Dr. J. A. Northrop, the Defense Nuclear Agency's deputy director for science and technology, disclaimed any responsibility for the selection of patients or their treatments.

"That isn't us. It's the University of Cincinnati. We are not paying for treatment. We are paying for specific studies to test the effects on radiation on humans," he said.

These studies, explained Lt. Col. John W. Cable, a veterinarian who is the Defense Nuclear Agency's medical officer for the project, would not normally be done in the routine treatment of cancer patients.

They include detailed examinations on the effects of radiation on the patients' blood cells, their chromosomes, their metabolic process and their ability to think.

"We are getting valuable data to show what changes occur," said Cable.

Nevertheless, he and Northrop said this is the only research project of its kind that the Defense Nuclear Agency is funding.

The agency is sponsoring other studies on the effects of radiation on animals, they said. But both they and Saenger agreed that it is hard to apply animal data to humans.

Northrop said the Defense Nuclear Agency "is latching on to glean whatever data we can from an existing project.

"We have the responsibility of being able to establish the capability of a military person to function in a nuclear environment," he added. "Nuclear war is still a real threat."

Cincinnati's Silberstein is convinced that the project will advance medicine in ways that have nothing to do with a nuclear battlefield. He said that three of the 111 patients treated so far were children with a disease called Ewing's tumor, which has proven completely resistant to drugs or local radiation.

"Our three children are alive and healthy from 1½ to 3 years after being given total-body radiation," Silberstein said. "One of them won the Indiana dribble, pass and shoot championship for 10-to-12-year-olds. We're proud of that."

Saenger said he believes in the worth of the project, no matter what controversies might swirl around it.

"There is a need to investigate the effects of radiation on human beings to give support to the military," he said. "These are tough problems that should not be swept under the rug, and I personally think the work we're doing is dammed important."

[From the Washington Post, Oct. 9, 1971]

KENNEDY TO INVESTIGATE RADIATION TEST PROJECT

(By Stuart Auerbach)

Sen. Edward M. Kennedy (D-Mass.) said yesterday that his health subcommittee will hold hearings into a Pentagon research project that uses cancer patients to test the effects of radiation on human beings.

"I was shocked and disturbed to learn from today's Washington Post," Kennedy wrote Defense Secretary Melvin Laird yesterday, "that the Defense Department is sponsoring research on radiation effects on human beings without informing the individuals involved of the military purposes of their irradiation."

"I believe this project represents an incredible infringement of individual liberty and establishes a dangerous precedent for the reduction of human rights in our society," Kennedy continued.

He asked Laird for a full report on the project, conducted for the past 11 years by doctors at the University of Cincinnati's College of Medicine under grants from the Pentagon's Defense Nuclear Agency, so that he can hold hearings next month.

These hearings will be part of a series that the Senate Health Subcommittee will hold on the ethical and social implications of new advances in medicine.

Under the Pentagon study—designed to "understand better the influence of radiation on combat effectiveness of troops"—111 cancer patients received total or partial body radiation.

The Cincinnati research team, headed by Dr. Eugene Saenger, said that treatment would help the patients. But other specialists disagree. They said that with the exception of leukemia and Hodgkin's disease, whole or partial body radiation is not an accepted means of treatment for cancer.

Dr. J. A. Northrop, the Defense Nuclear Agency's deputy director for science and technology, said that Saenger assured him yesterday that there is a medical debate over the use of whole or partial body radiation.

As a result, Northrop said, he has decided "to let the issue be discussed a little bit among the pros" before reviewing the grant.

Defense Department spokesman Jerry W. Friedham called The Post's story "essentially correct." He said the research was part of the Pentagon's "continuing support of medical research." But, he added, the Defense Department doesn't decide what kind of treatment should be used.

Meanwhile, the United Methodist Board of Christian Social Concern, meeting here, passed a resolution yesterday calling on President Nixon "to halt this type of research immediately and completely."

"For the government of the United States to sponsor such research reduces the government to a barbaric level," the resolution said.

The Methodists also asked Congress to ban such research.

PENTAGON'S RADIATION STUDY DEFENDED

CINCINNATI.—A Pentagon-funded research program that has exposed seriously ill cancer patients to "whole-body" radiation was defended here today by doctors helping to administer the program.

Dr. Eugene L. Saenger, head of radiology at the University of Cincinnati Medical Center, said that 81 patients given whole-body radiation under a contract with the Pentagon's Nuclear Defense Agency were told the Defense Department would benefit from their treatments. Dr. Saenger also said the patients were told how much help they might expect from the treatments.

"In each case the patient is advised the information obtained through his treatment may be used by the military," Dr. Saenger said. "Each patient is fully informed about the treatment and usually interviewed before treatment with a member of his family present."

Dr. Saenger said that "insofar as we have been able to tell, none of the patients died as a result of the treatment. These patients had a life expectancy of less than two years when they entered the program."

Dr. Saenger made the comments in answer to a story in last Friday's Washington Post which said that 111 cancer patients had undergone whole-body radiation treatment at the University of Cincinnati over the last 11 years. The Washington Post said that the treatments had been paid for by the Pentagon "to understand better the influence of radiation on the combat effectiveness of troops."

The story in The Washington Post said that the Nuclear Defense Agency had paid the University of Cincinnati $850,000 since 1960 to keep the study going. The Washington Post was told by Dr. Saenger that the Pentagon was "just about" the sole support for the project over the last 11 years.

Dr. Edward A. Gall, University of Cincinnati vice president and director of the medi-

cal center, denied that the Pentagon provided the only funds for the project. Dr. Gall said that the project had been under way for five years before the Pentagon learned of it.

The $850,000 paid to the University by the Pentagon, Dr. Gall said, amounted to only 40 per cent of the total cost of treatment and hospital care for the patients. Dr. Gall would not explain where the other 60 per cent came from or what it paid for.

Dr. Gall said that 111 patients were included in the study, but that only 81 received radiation treatments for their cancers. He said 27 patients were dropped "for medical reasons" before they were irradiated.

Dr. Saenger said that six of the 81 patients are still alive.

The Washington Post's story said that all but three of the cancer patients treated in the project were charity patients with six years of schooling and had IQ's that averaged a below normal 86 (average is 100).

"Of course those in the study will reflect the types of patient we have in the General Hospital," Dr. Saenger said. "The sole method of selection is the fact of advanced cancer."

BRITISH DOCTOR SAYS HOSPITALS EXPERIMENT

(By Alfred Friendly)

LONDON, October 11.—A British physician has alleged that London hospitals are carrying out medical experiments on charity patients in a manner similar to that reportedly followed by the University of Cincinnati College of Medicine.

[The Cincinnati school had been accused of experimenting without the patients' full knowledge, but it edited the charge today.]

The two institutions named by Dr. Maurice Pappworth, and today that the allegation was "completely without foundation" and created a "monstrously false impression."

Dr. Pappworth made his charge, alluding to news report Friday that the Cincinnati institution was treating terminal cancer patients with total irradiation without disclosing to them that the project was funded by the Pentagon to obtain information on radiation effects suffered by soldiers in battle.

The author of a 1967 book called "Human Guinea Pigs," in which the same charges were made, Dr. Pappworth said that in Britain, as alleged in America, the subjects were charity patients and destitute.

Few people would submit to the experiments voluntarily, he said. So instead, the hospitals "use the comatose, the cancer patient and children." He said terminal cancer patients had been used for experimental work on liver disorders.

The Times of London editorialized today that "had the Cincinnati experiment been publicly reported it would no doubt have been stopped long ago."

It added that in distinction to some American practice, "the British view is that only patients fully capable of exercising choice can give valid consent and that relatives cannot agree to research on children or those whose faculties are impaired."

ANOTHER NASTY NUCLEAR SURPRISE

Mr. GRAVEL. Mr. President, the apparent collapse of the plan to bury radioactive waste in the Carey Salt Mine is startling news.

So is the disappearance of 175,000 gallons of water—hopelessly lost—in a tiny area where the Atomic Energy Commission allegedly understood the geology thoroughly, and the movement of water in particular. There are also additional problems just revealed.

The failure of both the AEC's final environmental 102 statement and the National Academy of Sciences review to disclose such serious problems at Lyons, Kans., raises a mammoth question: What good is a 102 statement, or a NAS review?

Mr. President, I ask unanimous consent to have the following nine items printed in the RECORD after my remarks:

First. Associated Press story from Topeka, Kans., October 1, 1971.

Second. AEC Staff Report on American Salt Co. Operations (no date).

Third. Letter from AEC General Manager, John A. Erlewine, to the Joint Committee on Atomic Energy, September 30, 1971.

Fourth. Article, "AEC May Change A-Waste Plans," Washington Post, October 6, 1971.

Fifth. Article, "Skubitz Says AEC Can Take Its Atomic Waste Plan and . . .," from the Pittsburgh Headlight-Sun, October 7, 1971.

Sixth. Story on waste from Nucleonics Week, October 7, 1971.

Seventh. Article, "Nuclear Garbage Disposal: A Buried Problem," Washington Post, September 19, 1971 (p. D5).

Eighth. Article, "Waste Disposal Wells, Once Considered Safe, Now Seen as Polluters," Wall Street Journal, May 21, 1970.

Ninth. Article, "Dangerous Radiation in Washington Ducks," Oakland Tribune, March 14, 1970.

It must be a crime against humanity to produce lethal radioactive garbage—some of which will remain dangerous for hundred of thousands of years—when no one knows yet what to do with it. If it is not a crime, perhaps it is insanity instead. It is certainly not innocence, because the individuals who do it and those who endorse it are not unaware of the objections.

Is it impolite to insist that we examine the moral implications of nuclear electricity? Even with today's mini-amount of nuclear electricity, this country is producing about as much indestructible radioactive debris in 1 year as the United States, U.S.S.R., and Britain combined produced during all their atmospheric nuclear weapon tests. One hundred and eighty megatons is a whopping amount of fission, and if it is reactor garbage which is produced instead of bomb fallout, it is not even distributed all over the Northern Hemisphere. It is ours alone, to have and to hold.

The AEC already figures it is 5 years behind schedule in fighting the waste guardianship problem, according to the Washington Post, September 19.

If as little as 1 percent of our present annual production of radioactive garbage is lost to the environment, the equivalent of about 100 Hiroshima bombs would be contaminating this country every year. Can the AEC account for—locate—99 percent of the radioactive garbage already produced in this country?

The answer needs to cover low-level radioactivity as well as high-level radioactivity; in this country, low-level radioactivity is disposed of by release into air and water, burial, pumping, dumping, and dribbling it into the ground. That is why I placed the articles on unpredictable disposal wells and on radioactive ducks in today's RECORD. They might be a minor bit of the human comedy if their implications with regard to nasty surprises and carelessness were not so serious when it comes to the most dangerous pollutant of all.

If the nuclear power program is allowed to expand, even permanent containment of 99.999 percent of the radioactive inventory will result in serious pollution of the planet.

Is there any industry in the history of man where 99.999 percent containment of a physical substance has been attempted? And achieved? Can the independent engineering community be persuaded to give some thought to this question?

There being no objection, the nine articles were ordered to be printed in the RECORD, as follows:

ASSOCIATED PRESS STORY FROM KANSAS, OCTOBER 1, 1971

TOPEKA.— Gov. Docking and Rep. Roy ask Atomic Energy Commission to take proposed nuclear waste dump elsewhere in aftermath of disclosure that Lyons Site is not safe; Governor vows to fight locating it anywhere in State until all questions answered.

"The AEC's steamroller approach and its early statements that Lyon Site was safe have given me very little reason to have confidence in the AEC's future claims.

"I agree with Kansas Congressman Billy Roy that the AEC also should look outside Kansas and possibly outside the continental United States for a suitable site for a nuclear waste repository," said Gov. Docking.

The AEC said Friday it has not yet abandoned the Lyons Site—which was first announced as the Prime Site in June 1970—but all other statements given by the AEC confirmed what Skubitz had reported Thursday night.

Statement given newsmen by Robert Newlin, AEC public relations staffer, prompted the Sierra Club to ask how many salt beds the AEC wants to use in Kansas as waste repositories.

Ron Baxter, Kansas Sierra Club Chairman, said he, like Skubitz, is positive the Lyons Site has been abandoned by the AEC. He demanded to know where else the AEC is looking and how many locations it might use in Kansas. He said he had information that the AEC might want as many as three sites.

"Why haven't the people of Kansas been told how many sites they are looking at?" Baxter asked. "They obviously are abandoning the Lyons Site, and are looking at other sites. They have a new contract with the Kansas Geological Survey signed over two weeks ago to check out new sites."

Baxter accused the AEC of "simply not telling the truth; they said a year ago that all the geological work had been done, and none of it had been done."

Baxter said, "the decision to give up on Lyons has been made and the AEC won't admit it because it doesn't want to lose face.

"We in the Sierra Club have no doubt in our minds whatsoever that the AEC is abandoning the Lyons Site. I have a source at the Oak Ridge Laboratory in Tennessee that has confirmed to me that the Lyons Site is as dead as a doornail."

The AEC denied Friday it already has abandoned the Lyons Site, saying it is "still actively investigating the advantages" of the mine.

But the AEC also confirmed it has contracted with the geological survey and Dr. Robert Walters of Wichita, a consultant for the Oak Ridge, Tenn., National Laboratory, to search for alternative sites.

The AEC statement confirmed that problems with oil and gas wells and water runoff had been encountered at the Lyons

Site. "While these matters are being evaluated to determine their potential effect on the repository, a search of the literature on other potentially suitable areas in Kansas is being made," Newlin said.

Skubitz and Baxter termed the AEC response a matter of semantics. Technically, they said, the AEC has not yet abandoned the Lyons Site. But they said they are positive the decision has been made to abandon it whenever a better alternative is agreed upon.

Baxter said that doesn't satisfy the Sierra Club, however.

"What we really want them to admit," Baxter said, "is that this is just a scheme to make Kansas the nuclear waste dump of the Nation.

"We don't want those wastes in Kansas, period. The AEC has not told Kansas the truth in the past; how will we ever know when they're telling us the truth?"

AEC STAFF REPORT ON AMERICAN SALT COMPANY OPERATIONS

The American Salt Company operates a salt mine at Lyons, Kansas, which at its nearest point is estimated to be between 1500–1800 feet from the existing Carey salt mine. This Company engages in both mechanical mining operations (depicted in black on the enclosed map) and solution mining operations (depicted in green on the enclosed map).

The actual extent of the area mined by solution techniques is not fully or clearly understood since it is difficult to accurately map out the size and shape of caverns formed by this method. The Company President indicates that the Company has mined out an area one-half by three-quarters of a mile (shown in green on the enclosed map) which lies approximately two miles from the Carey mine, but it is evident that he is not sure of the extent or shape of the solution-filled cavity.

The solution mining technique removes all the salt from the bed, leaving no supporting pillars to prevent subsequent collapse of the mined-out area. One problem which is introduced by the nearby solution mined area is, therefore, the potential for sudden and dramatic collapse of a fairly large area not too far from the Repository site, with the formation of a surface lake which could be several hundred feet deep. While it is likely that such a lake would have no real technical significance to Repository safety, its formation and presence could certainly engender unfavorable emotional and public relation problems should it form during the construction or early demonstrational phases of the Repository.

Another question, which American Salt Company activities raises, deals with an attempt made at one point in their solution mining operations to use a hydraulic fracturing technique to dissolve and remove salt from the formation. In this technique, two holes are drilled into the salt formation at different locations (as opposed to the single hole concentric pipe technique used by the Company for its normal solution mining). Water under pressure is forced down one hole; it fractures the salt bed and works its way to the second hole where it returns to the surface as saturated brine. In the one attempt made, after only a few hours of operations, water pressure was lost and some 175,000 gallons of water disappeared. The experiment was terminated and no further work was done on this method. American Salt people could not determine what had happened, and the expert consensus is that we will never know whether the water broke through to the Arbuckle formation below the salt or to the aquifers above the salt bed, or whether it moved through the salt bed in more or less horizontal directions.

The uncertainty of the fate of this water raises the questions of whether it, and possibly other water in the solution mining cavern could be selectively migrating toward the Carey salt mine. Further evaluation of this possibility is required.

A third problem raised by the American Salt Company's operations, this one in the mechanical mining section of the mine, came to light last March and was discussed with the JCAE at that time. At that time, in the course of drilling small holes in the mine face for emplacement of explosive charges for further mining operations, water started leaking into the mine. Similar drillings at different elevations indicated that one of the many gas or oil bore holes in the area had been intercepted and that water, either from the Arbuckle below, or an aquifer above the salt bed had leaked into the mine. The hole was satisfactorily grouted and sealed as far as continued salt mine operation is concerned, but the incident raises the question as to knowledge of the location of oil and gas holes. The conclusion of the American Salt Company people is that this hole, which was thought from its surface position to be at least 100 feet from where the drilling was taking place, probably had penetrated the subsurface structures at an angle after hitting some drilling impediment. There is also the possibility that inaccuracy of underground surveying resulted in the mine operator not knowing exactly where he was working.

In any event, the potential impact on repository operation should such events occur in the American mine in the future, needs careful evaluation, as does the potential of intercepting gas and oil wells in Repository operation itself.

GAS AND OIL WELL SEALING

The initial survey of the Lyons site and the one-mile buffer zone surrounding it has shown that there are twenty-nine known abandoned gas and oil well penetrations that extend into or below the salt formation and there may be others that will be found by more extensive surveys.

An ORNL consultant in Kansas has made a study of the characteristics of these 29 holes and has concluded that for 26 there is a very high probability that the work necessary to reenter, cleanup and safety plug the holes can be successfully accomplished. With respect to the other three holes, however, it is the opinion of the expert consultant that the probability of successfully plugging the holes is very low.

While this fact, in itself, does not make the site unacceptable or unsafe, since there are ways which can be used to assure that the unplugged holes, when adequately mapped, will not be a vehicle for introduction of water into the mine, more evaluation and study of the problem is required to assess its true impact on safety.

SEPTEMBER 30, 1971.

Mr. EDWARD J. BAUSER,
Executive Director,
Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. BAUSER: This letter is to confirm discussions held on September 24, 1971, with you and Mr. Shwiller by Dr. Pittman and Mr. Donoghue of the Atomic Energy Commission's Division of Waste Management and Transportation regarding a literature study which we plan to make on possible alternative sites in Kansas for the National Radioactive Waste Repository.

The Commission decision to make this study arose as a result of certain additional information, given in more detail in the enclosure hereto, which has recently come to light concerning: (1) operations of the American Salt Company mine near the Lyons site; and (2) problems of plugging of the numerous deep oil and gas wells located on or immediately adjacent to the Lyons site.

In each instance, the new information raises questions concerning our ability to assure that water will not be introduced into the bedded salt formation at the repository site. Since absence of water is a key factor in the long range safety of the use of the bedded salt as a storage repository for radioactive waste, the Commission feels that its only prudent course of action, pending a more detailed and extensive evaluation of the new information, is to make a literature search to identify other potential repository sites in the Kansas salt bed formation. We would stress that the Commission has not made a finding that the Lyons site is unacceptable or that any other more acceptable site can be found. Our objective is to assure that, should our future evaluation indicate that Lyons is not safe and acceptable by reason of unresolvable problems raised by American Salt Company operation or by the existence of oil and gas well penetrations which cannot be satisfactorily sealed, continuity of this very important effort will not be compromised.

We have, therefore, instructed the Oak Ridge National Laboratory to enter into a contract with the Kansas Geological Survey, as the group having the most knowledge and greatest degree of expertise on the situation in the State of Kansas, in cooperation with Dr. Robert Walters, an ORNL consultant from the Kansas area, to undertake a *literature survey of various potential locations in Kansas where salt bed thickness and depth, the overlying and underlying formations, and other geologic and hydrologic factors are similar to those at Lyons.* As a part of this overall study, the KGS will work with the AEC and ORNL in the development of detailed criteria which could be used for specific site selection should this be necessary. The study will be *complete by November 1, 1971,* and the final report will be available by December 1, 1971.

Pending further evaluation of the "hole plugging" problem and further discussions with the American Salt Company management to lead to a better understanding and evaluation of potential problems raised by their activities, and awaiting the results of the KGS study, we *are holding in abeyance any further site oriented work at Lyons, including leasing of land and plugging of holes.*

During the course of the meeting on September 24, 1971, you raised questions concerning the Advisory Council called for by the FY 1972 Authorization Act. We have no information on the status of appointment or potential membership of the Council, nor are we informed on how the administrative aspect of the Council's operation will be handled.

We hope that this letter and its enclosures furnish you the information you need, however, should you require additional information, please let us know.

Sincerely,

JOHN A. ERLEWINE,
General Manager.

[From the Washington Post, Oct. 6, 1971]

AEC MAY CHANGE A-WASTE PLANS

(By Thomas O'Toole)

The Atomic Energy Commission might move its nuclear waste burial ground from a salt mine in Lyons, Kansas, because of the unexpected discovery that water could flood parts of the mine.

The AEC has yet to bury any of its radioactive wastes in the abandoned mine, but has chosen the Kansas salt bed as the national "respository" for atomic wastes partly because it is dry and distant from any water that could leak in and leach wastes out of the mine.

In a letter to Congress' Joint Committee on Atomic Energy, AEC General Manager John A. Erlewine admitted that "new information" raises questions "concerning our ability to assure" that water would not make its way into the Lyons mine.

"Since absence of water is a key factor in the long-range safety of the use of bedded

salt as a storage repository for radioactive waste," Erlewine wrote, "the Commission feels that its only prudent course . . . is to make a literature (geological record) search to identify other potential repository sites in the Kansas salt bed formation."

Erlewine stressed that this does not mean the AEC has given up on the Lyons salt mine site, "but that it does mean we are giving consideration to moving sites."

The Lyons salt mine is a small part of a Kansas salt bed that goes as deep as 1,000 feet and which covers an area below ground of 10,000 square miles.

The Lyons site is an abandoned mine where the AEC has spent three years and more than $1 million examining the concept of storing radioactive wastes in salt mines.

Two things cropped up recently which strongly suggested that the Lyons site was not as free of water as the AEC thought it was, Erlewine said.

Geologists discovered that three of 29 known oil and gas wells near the Lyons site might prove extremely difficult to plug, meaning that water could leak from these holes into the Lyons salt bed.

More important, AEC engineers found that the American Salt Co. used a method known as "solution mining" to flush out all the salt from a huge (one half by three quarters of a mile) bed only miles from the Lyons mine. This raises the possibility of a "sudden and dramatic collapse" of the mined-out area and the formation of a subterranean lake that could flood the Lyons mine.

At one point in its solution mining of the nearby bed, American Salt forced water down a hole to fracture the salt bed and flush salt to the surface.

"In the one attempt," the AEC said, "some 175,000 gallons of water disappeared . . . The expert consensus is that we will never know whether the water broke through below or above the salt or whether it moved through the salt bed."

[From the Pittsburgh Headlight-Sun, Oct. 7, 1971]

SKUBITZ SAYS AEC CAN TAKE ITS ATOMIC WASTE PLAN AND . . .

TOPEKA, KANS.—U.S. Rep. Joe Skubitz, R-Kans., called on Kansas state officials to join him in telling the Atomic Energy Commission now to take its plans for a national nuclear waste repository and get out of Kansas.

"In so doing, I believe you will have the support and approval of the overwhelming majority of the citizens of our state," Skubitz said in a wire he sent Wednesday to Gov. Robert Docking. Lt. Gov. Reynolds Shultz, Atty. Gen. Vern Miller, Senate President Pro Tem Glee S. Smith and House Speaker Calvin Strowig, seeking bipartisan support.

Skubitz also made public a telegram which U.S. Rep. John P. Saylor, R-Pa., sent to Dr. James R. Schlesinger, chairman of the Atomic Energy Commission, asking the AEC to be more candid with Congress in the future.

There was no immediate response from the state officials to Skubitz's wire to them, but they said they had not received the dispatch.

Ron Baxter, chairman of the Kansas chapter of the Sierra Club, joined Skubitz in another bid to get the AEC to abandon Kansas entirely as a site of the proposed nuclear waste repository.

Skubitz' call on state officials said in part:

"The imminent rejection of the Lyons salt mine as an atomic repository site should be a signal for all Kansans—state officials, legislators, environmentalists, civic organizations students and concerned citizens—to politely but firmly tell the AEC to pick up its marbles and get out of our state.

"It is now clear that the AEC has concealed and withheld important facts and has misled members of Congress.

"The AEC knew months ago that some of the wells 4,000 feet deep were leaking water and were impossible to plug. It knew last March that vast amounts of water had disappeared under pressure in adjacent salt beds.

"In spite of these damning facts that made the Carey site dangerous for atomic waste burial, it (AEC) continued to insist to Congress that it needed more funds to acquire lands.

"Like so many bureaucratic agencies, it dared not admit publicly that maybe it had been wrong.

"The facts compel a vote of non-confidence in the AEC. I urge you, therefore, to move forward with actions that will deny this agency the right to establish a waste dump in this state, now or ever."

While he didn't spell it out, a spokesman in Skubitz' office in Washington said the congressman was suggesting actions such as the legislature passing a resolution asking the AEC to take the proposed repository elsewhere.

Skubitz reported from Washington last he is convinced the AEC abandon the proposed site of the repository in the old Carey Salt Co. mine at Lyons, Kan., but is looking for other possible sites in Kansas' extensive salt beds of west-central Kansas.

The AEC has denied it has abandoned the Lyons site, but has confirmed it has commissioned the Kansas Geological Survey to study other possible locations, and has admitted through a letter John Erlewine, assistant general manager of operations, sent to the Joint Committee on Atomic Energy that the AEC is now aware of water problems in the Lyons mine.

Erlewine's letter to the joint committee was the subject of a story by science writer Thomas O'Toole in the Washington Post Wednesday. It was this story which Rep. Saylor referred to in his wire to Schlesinger Wednesday. Wrote Saylor:

"The story in the Washington Post this morning about the Kansas disposal site was quite a relevation. Your predecessor (as AEC chairman) assured the Congress and the country that all the problems regarding atomic refuse disposal at the Kansas site had been resolved, in spite of doubts raised by Congressman Skubitz, myself and many others.

"It is a tremendous relief to know that in the Schlesinger era, the AEC may admit to non-infallibility. After 25 years of AEC-JCAE (Joint Committee on Atomic Energy) secrecy and omnipotence, things are looking up for the public.

"We may even wake up one day and hear the AEC admit that nuclear power is not the only alternative to the nation's energy problem."

Baxter called on the AEC to "step forward and admit that their prior statements for over a year concerning the proposed Lyons nuclear waste dump have been in error and that they are desperately trying to save face and at the same time abandon the site."

Warned Baxter:

"In the event they (AEC) attempt to continue at Lyons, they will be met by the strongest opposition in the courts the Sierra Club can present. There is no doubt in my mind from information we have received from the state Geological Survey that any attempt to proceed at the Lyons site would be folly on the part of the AEC.

"If they are to look elsewhere, let them begin here and now look outside the state of Kansas. We have no obligation to serve as the nation's commercial nuclear graveyard, and they have no right to impose the most dangerous environmental project known to man on future generations of Kansans."

[From Nucleonics Week, Oct. 7, 1971]

AEC EYEING OTHER KANSAS WASTE REPOSITORY SITES; LYONS NOT ABANDONED

AEC has had second thoughts about the Lyons, Kansas, site of its planned national radwaste repository, and has commissioned a literature survey of other possible sites in the Kansas salt formation. This does not mean that Lyons is being abandoned, said Frank Pittman, head of AEC's Div. of Waste Management & Transportation. "Lyons is still the site as far as I am concerned," he said, adding that if safety problems with the Lyons site now being investigated prove to be insuperable, AEC will be ready with alternative sites.

However, the AEC action is tacit abandonment of the Lyons site in the eyes of Rep. Joe Skubitz, the Kansas congressman who has all along objected to the use of Kansas as a "dumping ground" for nuclear wastes. An aide of Skubitz said that the congressman would oppose another site in the state if it is selected as a result of the survey.

In the meantime, all work has been stopped at the Lyons site, and no more land is being leased for a while. The reasons for the sudden decision to look for another site were set out in an AEC letter to the Joint Committee on Atomic Energy last week. One reason is that the American Salt Co. pumped 175,000 gallons of fresh water into its salt bed adjacent to the Lyons site in a salt-recovery operation; the water disappeared instead of coming to the surface as brine and the company and AEC experts do not know where it went. This throws doubt on the Lyons project because water from the American Salt operations could enter the radwaste-bearing formations and flush out the granular waste material. The neighboring company's solution-mining leaves no salt pillars underground and the AEC letter said there is a potential "sudden and dramatic collapse of a fairly large area not far from the repository site, with the formation of a surface lake which could be several hundred feet deep." This wouldn't be likely to have any technical significance to repository safety, but the lake's "formation and presence could certainly engender unfavorable emotional and public relations problems. . . ." The salt company says it will continue mining for 30 or 40 years.

The other principal problem that has caused AEC to question Lyons is that three out of 29 neighboring oil and gas drillholes probably cannot be plugged. The abandoned holes extend into or through the salt bed; water could seep into the repository through the unplugged holes.

The study of other possible sites will be done by the Kansas Geological Survey and Robert Walters, a consulting geologist. They will study geological camps, oil and gas drilling logs, and other records to select a few sites that meet the AEC criteria for a waste repository. The study will be completed by Nov. 1 and the final report wil be available by Dec. 1. After that, according to AEC's Pittman, will come a lengthy period of evaluation by AEC staffers before a final decision is made to choose another site or go on with the Lyons site. State sources say that other sites to be examined are in the vicinity of Hutchinson, Kansas, some 17 miles southeast of Lyons, and in a remote spot astride the Lincoln and Osborne county lines, some 50 miles northwest of Lyons.

Some state and congressional sources allege that AEC misled them by saying all along that Lyons would be safe while knowing about the American Salt Co. problems and the drillholes. Pittman countered that the difficulties only recently came to light, although the general situation had been known for some time. The fact that the salt company announced recently that it would continue mining for 30 or 40 years brought the matter to a head, Pittman said.

In weighing the chances for Lyons being abandoned, a scientist at the state geological survey said he would not be surprised if it was. The American Salt Co.'s workings run to within 1,500–1,800 feet of the Lyons mine. "Floodwater could get into the storage salt and if the waste was free in the salt a thermal-driven transport system could be set up that could drive the waste-bearing salt up to the surface. This has been our concern from the beginning," he said. He added that the problems of the Lyons site were known for some time; he did not understand why the survey of other sites had not been done before. "The whole attitude at AEC has been very different since the new chairman Schlesinger came in. They are bending over backward to do a decent job. They had been saying recently that Lyons would be quite safe, and earlier they were saying that additional research didn't need to be done at all," the source said.

[From the Washington Post, Sept. 19, 1971]

NUCLEAR GARBAGE DISPOSAL: A BURIED PROBLEM

(By Thomas O'Toole)

GENEVA.—Of all the countless and complex issues that faced the 4,000 delegates to the fourth Atoms-for-Peace conference these past two weeks, none seemed so staggering or so ignored as the problem of radioactive waste disposal.

"It's the most pressing problem we have in the field of nuclear energy today and yet so many people kept insisting there was no problem," said one veteran American delegate to the United Nations conference. "I think I actually heard some people pretend that there was no trash produced by nuclear power plants."

By one estimate, the 102 nuclear power plants generating electricity around the world today will produce as much as 300 tons of radioactive waste by the end of this year. Consider the amount of waste that will be generated in 1980, when there will be 350 nuclear power plants, and by 1990, when as many as 1,500 atomic plants will be producing electricity around the world.

By the turn of the century, the Soviet Union's N. N. Bogulobov told delegates from 79 nations last week, half the electricity in the world will be generated by atomic power. That adds up to 3,000 nuclear plants producing 50,000 tons of radioactive garbage every year.

The big question facing the nuclear power countries will be how to best package and safely dispose of all that refuse. One thing seems clear, if a catastrophe is to be avoided. The garbage disposal techniques of today, it is hoped, will not be the methods used in the year 2000.

Great Britain pours its "coolest" nuclear wastes (those that are at least concentrated and the least poisonous) through pipes at its Winscale reprocessing plant directly into the Irish Sea. The Japanese pump their "low-level" waste right into the shallow parts of the Pacific Ocean, from a plant on the east coast of Japan.

Many European countries save their "medium-level" waste in steel containers lined with concrete, then ship them to sea where they're dropped into the deepest parts of the North Atlantic. The Soviet Union disagrees with ocean dumping. The Soviets prefer to pump their medium-level refuse into the bowels of the earth.

The United States disagrees with both the European and Soviet disposal methods in two ways. First, the U.S. doesn't believe in keeping medium-level wastes. Instead, it concentrates them into high-level wastes and then stores all high-levels in giant steel containers cooled by circulating water and kept only 20 or 30 feet underground so they can be checked for leaks.

"Even this is only a temporary technique," says Floyd Culler, deputy director of the Oak Ridge National Laboratory. "There's no way you can guarantee these containers won't spring leaks in the next 20 or 30 years."

RADIOACTIVE TRASH

Part of the problem with radioactive garbage disposal is the trash itself, which is not at all like the kind of refuse produced by coal or oil-fired plants.

First, there's no soot, ash or sulphur dioxide pouring out of a nuclear smokestack. As a rule, nothing comes out of atomic smokestacks but waste heat and an occasional vent of radioactive gas like krypton 85, which quickly rises and gets lost in the upper reaches of the atmosphere. Even that will stop soon in the United States, where the plan is to capture these gases before they leave the plant and bottle them in special disposal containers.

Atomic power plants discharge very little radioactive debris into the water. Some tritium (an isotope of hydrogen about which little is known) escapes with the cooling water, but that's expected to cease too when tritium scrubbers are installed in nuclear power plants.

Nuclear garbage piles up when a plant ships its spent nuclear fuel along with the metal cores and pipes that surround it to nuclear fuel reprocessing plants. There are a handful of small reprocessing plants and three large ones operating in the world today. A dozen more large plants are in the design stage.

A reprocessing plant is something like a nuclear abattoir, accepting the spent fuel elements of a plant every two years. The exhausted elements are cut open, spilling great quantities of fission by-products like strontium cesium and iodine and the liquefied metal oxides of uranium and plutonium.

These are the heavyweight poisons. They are lethal radiation sources and they all have long half lives. Strontium 90 has a half life of 29 years, cesium 137 of 30 years. Plutonium's half life is 24,400 years, iodine 129's is 16 million years. The two isotopes of uranium (U–235 and U–238) outlive them all. One has a half life of 100 million years, the other of 5 billion years.

Each element is separated out in an elaborate chemical process. The iodine, strontium and cesium are almost all waste. The uranium and plutonium get cleaned up to be used again but even they lose something in the treatment. By the year 2000, an estimated 600 tons of plutonium will go through reprocessing every year. Six to 8 tons of that will be waste.

NO USES FOUND

Scientists have tried countless ways of using the waste, from tapping the heat coming off the refuse to using the isotopes for research. Nothing has worked, and the result of this fruitless research is the present practice of keeping these liquid wastes in stainless steel tanks above the ground or just below it. Circulating water or refrigerants keep the tanks cool, and the tanks go through constant monitoring to make sure they spring no leaks.

Most experts agree that tank storage of liquid wastes of strontium, cesium, uranium and plutonium is at best an adventurous answer to the disposal problem. There is no waste disposal crisis today, but there could easily be one in 10 years when the wastes start mounting up.

"We're all asking for trouble," is the way it's put by Oak Ridge's Floyd Culler. "Liquids have a way of leaking, and no metal containers made today can stand up forever under the heat [average about 500 degrees F.] and radiation emitted by these long-lasting wastes."

Culler fully believes that the answer to the waste problem lies first in solidifying the liquid wastes, second in burying them in airtight and corrosive-resistant containers under beds of underground salt or chalk. Solidification removes the threat of a leak. Burial in salt or chalk (where there is no moisture to leak out the wastes) assures that the radiation will not migrate. Salt and chalk are as good a barrier to radiation as lead or concrete.

The United States is pushing for both solidification and salt mine burial for these wastes, and has already bought an abandoned salt mine near Lyons, Kan., to carry out the promise of burial. There are 10,000 square miles of salt in that Kansas bed, most of it 1,000 feet below ground. Culler figures it will take $50 million to remake the mine, $30 million a year to solidify and transport the wastes to the mine and another $5 million a year to operate the burial ground.

"It's worth the expense," says Culler. "I don't know what other options we have."

The trouble with the salt mine option is that it is being held up by Congress, in particular the Kansas delegation, which has persuaded President Nixon to shelve the scheme while an investigation board looks into the health and safety aspects of salt mine burial. Meanwhile, the Atomic Energy Commission figures it is already five years behind schedule in fighting the waste disposal problem.

WHY BOTHER?

If the U.S. is doing little to beat the radioactive waste problem, the rest of the world is doing even less. Germany and France have endorsed solidification and burial in salt, but neither has gone anywhere beyond endorsement. Britain fully believes it can go on forever containing liquid wastes in aboveground containers. Switzerland, Italy, Japan and Sweden have contracts to have Britain dispose of their wastes, so in effect anything Britain does is all right with them.

The European attitude at present toward waste disposal seems to be one of why bother yet, it's no trouble now.

"It's very difficult getting good people to work on waste disposal," explains Andre Finkelstein, deputy director of the International Agency for Atomic Energy. "Besides, it's no problem now."

[From the Wall Street Journal, May 21, 1970]

WASTE DISPOSAL WELLS, ONCE CONSIDERED SAFE, NOW SEEN AS POLLUTERS—INDUSTRIAL RESIDUES PUMPED INTO EARTH CONTAMINATE WATER, MAY CAUSE QUAKES, BUT COMPANIES DEFEND THEM

(By Richard D. James)

Waste disposal wells, conceived nearly two decades ago as a cheap way to get rid of industrial wastes without dumping them into streams and rivers, are turning out to be worrisome polluters after all.

That's the cry being raised by an increasing number of scientists and Government officials as damage from the supposedly "safe" installations mounts. Consider these incidents:

In Ludington, Mich., a leak in a Dow Chemical Co. disposal well polluted an underground water supply.

In Erie, Pa., a well containing papermaking chemicals "blew its top," spewing thousands of gallons of the foul-smelling liquid into nearby Lake Erie.

In Denver the pressure caused by the Army's pumping of poison gas wastes underground is blamed for causing a spate of earthquakes that still are going on even though the pumping has ceased.

Worry over disposal wells is mounting with their use. Faced with stringent new antipollution laws designed to protect the environment, more and more companies are turning to wells to get rid of liquid wastes. The companies contend that when properly installed and operated, the wells can be the most effective means of disposal. But some others aren't so sure.

A FRANKENSTEIN'S MONSTER

"Underground waste disposal is a potential environmental Frankenstein's monster," declares Secretary of the Interior Walter Hickel. "All prudence dictates that we attack

this problem systematically before it gets out of hand."

The number of disposal wells isn't believed to be large as yet. One recent survey puts the figure at 150 in all. But some authorities believe the total already is much higher because hundreds of wells were drilled before many states required permits and more have been drilled illegally since. The present total compares with only 30 wells a decade ago, and experts predict the number will grow rapidly in the future.

Disposing of wastes underground is basically simple. A hole five or six inches in diameter is drilled into the ground until it reaches a layer of sandstone or limestone, usually 2,000 to 3,000 feet down. These porous formations act like a petrified sponge, soaking up liquid wastes that are pumped into them. The hole is encased in steel so wastes won't seep out the sides into drinking-water supplies that lie along the way.

Such a well can absorb huge quantities of waste. Pumping sewage at the above-average rate of 500 gallons a minute, it would take 200 years to saturate a 100-foot-thick layer of sandstone covering only 20 square miles. This is a relatively small formation; some measure 2,000 feet thick and cover 20,000 square miles.

EVEN DIRTY WASH WATER

A wide variety of wastes is being dumped into such underground "reservoirs." U.S. Steel Corp. puts hydrochloric and sulphuric acids left over from steel-treating into a 4,300-foot well at its Gary, Ind., works at the rate of 6.5 million gallons a month. Velsicol Chemical Corp., a subsidiary of Northwest Industries, uses a well in southeastern Illinois to get rid of 60,000 gallons of poisonous residues from pesticide manufacture daily. International Salt Co. puts waste brine from salt-mining down a well near Elmira, N.Y., and Du Pont Co. disposes of chemicals from Teflon production in West Virginia the same way. A self-service laundry in Oakland, Mich., even dumps its dirty wash water into a well.

The method appeals to industry at least partly because it usually involves a small initial cost, usually around $100,000, though some wells can be dug for as little as $20,000. By comparison, sewage treatment plants with settling tanks and other equipment for cleaning up wastes before they are dumped into a river typically cost $500,000 or more.

Wells are cheap to operate, too. Standard Oil Co. of Ohio puts waste from production of acrylonitrile, a flammable liquid used in making textiles and plastics, down a well. It figures it saves $500,000 a year by disposing of the material this way instead of burning it.

The wells' threat to the environment, however, outweighs the economic advantages, some scientists say. One big worry is where the wastes go once they get underground. The fear is that they could escape and contaminate underground water or mineral deposits over thousands of square miles.

FRACTURING THE ROCKS

Companies say they are careful to inject sewage only into sandstone or limestone formations that are sandwiched between impermeable layers of shale that prevent wastes from escaping. But critics say companies also like to engage in a practice called "fracturing," in which the wastes are pumped into wells under very high pressure. This cracks the rocks in the storage formation, thereby increasing a well's capacity, but it also can crack the shale, allowing wastes to seep out of the disposal "reservoir."

"We're just lucky we haven't had any major underground contamination so far, because the potential is there," warns E. L. Hendricks, chief of the U.S. Geological Survey's water resources division.

There already has been some underground pollution. Last fall the casing of a 2,500-foot-deep well operated at Ludington, Mich., by Dow Chemical Co. corroded at the 450-foot level, spilling thousands of gallons of brine into an underground freshwater pool. The exact amount of the spill is unknown because no one knows when the leak developed. Dow says it thinks the well leaked only two or three days before it was shut down but it concedes it could have leaked as long as three months. Fortunately the pool of underground water has not been tapped as a source of drinking water. The repaired disposal well was put back in service in February.

Disposal wells can pollute surface waters, too. Two years ago one of three wells operated by Hammermill Paper Co. in Erie, Pa., sprang a leak. The waste—a brown, putrid broth left over from processing wood chips into pulp—had been forced into the well under high pressure. When the trouble developed, the compressed liquid shot to the surface, forming a 20-foot geyser that spilled into nearby Lake Erie. It took three weeks to cap the well. By that time, more than two million gallons had escaped. In six years Hammermill has pumped 750 million gallons of the broth underground.

A different pollution problem has arisen in Port Huron, Mich. Officials of the Michigan Natural Resources Department say that chemical waste dumped into wells in Sarnia, Ontario, across the Detroit River from Port Huron, has caused a buildup in general underground pressures. This, in turn, has caused nearly a dozen old, abandoned oil and gas wells beneath the city of Port Huron to begin leaking.

In one case underground pressure forced crude oil up through an old well and through a concrete parking lot at the city post office. The parking lot had to be torn up and resurfaced and the well located and plugged.

In another case, oil seeps up through the basement floor of one Port Huron home at the rate of several gallons a month. Efforts to locate the leaking well and plug it have failed so far. In still another instance, flammable natural gas was found escaping into the air from a well only a few feet from a local hospital.

The disposal wells allegedly causing the trouble are owned by several oil companies, including Sun, Imperial and Shell, that operate refineries nearby. State and company officials have failed to agree on how to solve the problem. Michigan asked the oil companies to stop using the wells, but the companies contend that there's no conclusive evidence that their wells are causing the leaks in Port Huron.

EXPANSIVE SAFETY PROCEDURES

Nonetheless, at least one company, Imperial Oil Ltd., says it plans to abandon the five disposal wells at its Sarnia refinery and instead will put the waste down a new well being drilled 20 miles south. According to the company, the new well definitely won't contribute to the problem.

Companies generally defend underground disposal by saying it gets waste completely out of the human environment. They also say that the wells comply with state regulations. A few companies say that they make extensive geological studies to determine the suitability of underground rock for waste injection before they drill a well and that they construct wells of corrosion-resistant materials that won't leak.

Such safety procedures can be expensive; Reichold Chemicals Inc. is spending $675,000 on a well at its Tuscaloosa, Ala., plant. There's evidence, however, that most companies aren't willing to spend the sums needed for proper installation of the wells since this would destroy the economic edge the method provides, critics say. As to compliance with state regulations, critics point out that only a handful of states have laws specifically regulating underground disposal.

Aside from the pollution peril, many scientists say that pouring wastes underground is dangerous because the subsurface is the least-understood part of the earth and no one really knows how the wastes will behave.

AN ORANGE JUICE GEYSER

Florida water pollution officials, for instance, frankly admit they don't understand why a well in Orlando, operated by a citrus fruit processor, erupts every so often, spitting diluted orange juice and other citrus wastes onto company grounds. "It may have something to do with the flow of an underground river," says one official. The company, Southern Fruit Distributors Inc., which refuses to comment on the matter, is planning to abandon the well in favor of a surface waste treatment facility now under construction, according to state officials.

Scientists also say that the wells' impact on subsurface structures is dangerously unpredictable. They claim, for example, that in more than one case wells apparently have triggered earthquakes. In 1962 the Army drilled a 12,000-foot well at its Rocky Mountain Arsenal in Denver to dispose of waste from the manufacture of poison gas. A month after injection began Denver had its first earthquake in 80 years, and in the next five years the area experienced more than 1,500 quakes. No buildings have collapsed, but cracked windows and foundations have been widespread.

"Periods of increased pumping resulted in many quakes and periods of decreased pumping resulted in fewer quakes," says David M. Evans, a Colorado School of Mines geologist who studied the situation. "All the earthquakes originated near the well."

After pumping 150 million gallons of poisons into the hole, the Army abandoned it in early 1966. Since then the number of quakes has diminished. What probably happened, Mr. Evans says, is that the pressure of the injected wastes forced open cracks in the underground rock formations far enough to start the rocks sliding and shifting, producing the earth tremors.

Recognizing the problems arising from disposal wells, states are beginning to tighten their regulations. Illinois no longer allows wells to be drilled in a 2,500-square mile area around Chicago. This is to protect an underlying reservoir of slightly salty water that may be a future source of drinking water.

New York state recently declared that it regards underground disposal as a "last resort" after all other methods have been tried. Last month Florida halted all drilling of the wells until it can revise its regulations.

The Federal Government is taking more interest, too. Interior Secretary Hickel in December ordered the Geological Survey to take the lead in a research program to evaluate the effects of underground waste disposal. "There may be no perfectly safe way of disposing of wastes underground," he said. "But we must review existing regulations and start collecting the kind of environmental data needed to assess the level of risk and consider ways of organizing Federal, state and industrial efforts to solve this growing problem."

[From Oakland Tribune, Mar. 14, 1970]

DANGEROUS RADIATION IN WASHINGTON DUCKS

HANFORD, WASH.—The Atomic Energy Commission (AEC) said yesterday four ducks containing abnormally high levels of radiation had been found on the grounds of the Hanford works.

The ducks, which apparently fed in wastewater trenches at the nuclear facility, would have given a person five times the maximum permissible dosage of radiation if eaten immediately after shooting.

But if the ducks were consumed two months after shooting, the radiation dosage would be negligible, the AEC said. Two of the four contaminated ducks contained 0.1 microcuries of radioactivity, principally phosphorus 32, a spokesman said.

Atomic energy Commission officials explained that the type of radioactivity found was short-lived and decayed rapidly. A spokesman said the phosphorus 32 had a "half-life of 14 days."

Officials said the contaminated ducks apparently ate large amounts of algae and insects in the water trenches which catch water from storage basins for the nuclear reactors.

Fewer than 100 of the ducks of a transient population of more than 200,000 during winter months would spend a sufficient amount of time in the Hanford trenches to pick up enough radioactive material to exceed guidelines, officials said.

Officials said water from the overflow trenches does not flow directly into the nearby Columbia River.

QUORUM CALL

Mr. BYRD of West Virginia. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

ADDITIONAL PERIOD FOR THE TRANSACTION OF ROUTINE MORNING BUSINESS

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the period for the transaction of routine morning business be extended for 2 minutes.

The PRESIDING OFFICER. Without objection, it is so ordered.

ORDER FOR THE TRANSACTION OF ROUTINE MORNING BUSINESS ON TUESDAY, OCTOBER 19, 1971

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that on Tuesday next, immediately following the remarks of the able junior Senator from Missouri (Mr. EAGLETON), there be a period for the transaction of routine morning business for not to exceed 30 minutes, with statements therein limited to 3 minutes, following which the Chair lay before the Senate the unfinished business.

The PRESIDING OFFICER. Without objection, it is so ordered.

ORDER FOR RECOGNITION OF SENATOR BYRD OF VIRGINIA AND FOR PERIOD FOR THE TRANSACTION OF ROUTINE MORNING BUSINESS ON WEDNESDAY, OCTOBER 20, 1971

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that on Wednesday next, following the recognition of the two leaders under the standing order, the distinguished senior Senator from Virginia (Mr. BYRD) be recognized for not to exceed 15 minutes, following which there be a period for the transaction of routine morning business for not to exceed 30 minutes, with statements therein limited to 3 minutes.

The PRESIDING OFFICER (Mr. GAMBRELL). Without objection, it is so ordered.

QUORUM CALL

Mr. BYRD of West Virginia. Mr. President, I suggest the absence of a quorum. I assume this will be the final quorum call of the day.

The PRESIDING OFFICER. The clerk will call the roll.

The assistant legislative clerk proceeded to call the roll.

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

EXTENSION OF PERIOD FOR TRANSACTION OF ROUTINE MORNING BUSINESS

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that the period for the transaction of routine morning business be extended for an additional 6 minutes.

The PRESIDING OFFICER. Without objection, it is so ordered.

(The remarks of Mr. FULBRIGHT when he introduced S. 2700 are printed in the RECORD under Statements on Introduced Bills and Joint Resolutions.)

COMMUNICATION FROM GEORGE C. VOURNAS ON MILITARY AID TO GREECE

Mr. FULBRIGHT. Mr. President, in the past few weeks, I have received a number of letters from representatives of various chapters of a Greek-American organization, the American Hellenic Educational Progressive Association, known as the Order of Ahepa enclosing a resolution on "military aid to Greece." The resolution is identified as having been unanimously adopted at the organization's 49th Supreme Convention at Los Angeles, Calif., in August.

Because I assume that some of my colleagues have received similar communications, I thought that a letter I have received from George C. Vournas might be of interest. Mr. Vournas is an attorney in Washington who is past supreme president of the Order of Ahepa.

He has written me that, in his view, these resolutions are either unconstitutional or ultra vires. Mr. Vournas also states in his letter that—

> There appears to be extraneous evidence that these "resolutions" were inspired by the diplomatic and consular services of the junta.

I ask unanimous consent that the letter from Mr. Vournas of September 27 be printed in the RECORD.

There being no objection, the letter was ordered to be printed in the RECORD, as follows:

WASHINGTON, D.C.,
September 27, 1971.

Senator J. W. FULBRIGHT,
Chairman, Foreign Relations Committee of the U.S. Senate, Senate Office Building, Washington, D.C.

MY DEAR SENATOR: I am writing to you specifically on instructions of Sam Nakis, Supreme President of the Order of Ahepa, a Greek-American organization, for the purpose of sending you "resolutions" passed by the Order at its recent convention in Los Angeles pertaining to military aid to Greece!!! Others, no doubt obedient to the urging of the Supreme President, have addressed you, as I know they have also addressed the Majority Leader of the Senate. Our instructions from the Supreme President are that. . . . we contact our friends to send letters and telegrams—"especially (to) persons. . . . (who) will receive serious consideration from the United States Senate"!! With the dispatch of these "resolutions" I wish to make the following observations:

There appears to be extraneous evidence that these "resolutions" were inspired by the diplomatic and consular services of the junta, with the pardonable usual exaggerations—like all junta-inspired statements. (Ahepa membership in good standing as of June 30, 1971, according to the Ahepa Year Book of 1971, is 26,359.) His Excellency, Basil G. Vitsaxis, the junta Ambassador in Washington, has greeted them with ill-concealed glee!! (See Sunday "Star," September 12, 1971) Obviously the person who drafted the "resolutions" was either unfamiliar with the Ahepa Constitution or—junta-like—resolved to disregard it. The Ahepa is non-partisan and non-sectarian (Article III) and one dedicated to *democracy* and *freedom*.

(Article II, Paragraph E.—"To arouse mankind to the realization that tyranny, wherever it may exercise its baneful power, is a menace to the life, property, prosperity, honor and integrity of every nation; and that the preservation of our liberties can be assured, only as this country becomes the Champion of Liberty and the Defender and Protector of all oppressed and downtrodden peoples;")

Therefore, even assuming that these resolutions were properly passed by the Convention, I submit that they are either unconstitutional or, since the granting or withholding of arms to the Greek government, or fighting an undeclared war in Viet Nam is a political and avowedly partisan question, they are *ultra vires*. In either case, they are null and void.

I grasp the opportunity to apprise you that this is not the first time that the representatives of Greece, both diplomatic and consular, have scandalously interfered in Ahepa affairs. In 1939 the then-fascist-regime of General Metaxas dispatched Mr. Vassilios Papadakis to the United States to propagandize, threaten and cajole to enlist Ahepa support. The then-Archbishop (presently Patriarch Athenagoras), anxious to carry out Greek government instructions—as have been all his successors—sent circular letters to the churches urging them to receive Mr. Papadakis and the American-born youth of citizens of Greek descent to join the fascist-youth organization E.O.N. It must be stated—to Ahepa's credit and its leaders at the time—that noting that such activities were similar to the Hitler Bund and, as such, contrary to America's traditions, forced Mr. Papadakis to ingloriously depart from these shores. (Because the Church of Greece is constitutionally part of the State, the Ecumenical Patriarchate, under whose jurisdiction is the Greek Orthodox Archdiocese of New York, though *de facto* Greek, is *de jure a Turkish institution*, the Greek Orthodox Archdiocese of New York maintained thunderous silence even when the entire civilized world was protesting Turkish atrocities perpetrated against the Greek population of Constantinople over the freedom of Cyprus in the 1950s—a sad reminder of the pogroms and genocide against Armenians in the past and the slaughter of Christians in Smyrna in 1922. "The Smyrna Affair," Harcourt. Brace & World, Inc.)

The sponsors of these outrageous "resolutions" may point to the fact that the Ahepa did take similar action in its New Orleans Convention in 1938 protesting the persecution of Jews by Hitler. (Appendix B, "Greeks

In America") It does not take much erudition or knowledge of Constitutional or Parliamentary Law to distinguish those resolutions from the present atrocity. That was a protest *for freedom* and against tyranny in harmony with our constitutional provision that "the preservation of our liberties can be assured only as this country becomes the Champion of Liberty and the Defender and Protector of all oppressed and downtrodden peoples."

I assure you, my dear Senator, of my profound esteem,

Sincerely yours,

GEORGE C. VOURNAS,
Past Supreme President,
Order of Ahepa, 1942–45.

ORDER FOR RECOGNITION OF SENATOR RIBICOFF ON WEDNESDAY, OCTOBER 20, 1971

Mr. BYRD of West Virginia. Mr. President, I ask unanimous consent that on Wednesday next immediately following the recognition of the distinguished Senator from Virginia (Mr. BYRD), the distinguished Senator from Connecticut (Mr. RIBICOFF) be recognized for not to exceed 15 minutes.

The PRESIDING OFFICER. Without objection, it is so ordered.

PROGRAM FOR TUESDAY, OCTOBER 19, 1971

Mr. BYRD of West Virginia. Mr. President, the program for Tuesday is as follows:

The Senate will convene at 11 o'clock a.m. After the recognition of the two leaders under the standing order, the distinguished junior Senator from Missouri (Mr. EAGLETON) will be recognized for not to exceed 15 minutes, following which there will be a period for the transaction of routine morning business for not to exceed 30 minutes, with statements limited therein to 3 minutes.

At the conclusion of the routine morning business, the Senate will resume its consideration of the unfinished business, S. 215, dealing with proposed constitutional conventions.

As the distinguished majority leader stated earlier today, action on that measure will be followed, but not necessarily in the order stated, by S. 748, U.S. contributions to the Fund for Special Operations of the Inter-American Development Bank; S. 2010, increased participation by the United States in the International Development Association; and S. 749, U.S. contributions to the special funds of the Asian Development Bank.

Also, as the majority leader indicated, on next Tuesday, it is very likely that the conference report on H.R. 9844, the Military Construction Act of 1971, may be called up, that being a privileged matter.

The majority leader also stated that a bill which was referred to the Committee on the Judiciary, S. 986, the consumer bill relating to warranties, must be reported today under the order of the Senate. So that is a proposal which will come up next week, and there may very well be amendments and votes in connection therewith. The foreign aid authorization bill may very well be reported from the Committee on Foreign Relations on Wednesday next.

So, Senators are alerted to the possibilities of rollcall votes on Tuesday next and to the active schedule which is ahead for the Senate beginning with Tuesday of next week.

ADJOURNMENT UNTIL TUESDAY, OCTOBER 19, 1971, AT 11 A.M.

Mr. BYRD of West Virginia. Mr. President, if there be no further business to come before the Senate, I move, in accordance with the previous order, that the Senate stand in adjournment until 11 o'clock a.m. on Tuesday next.

The motion was agreed to; and (at 12 o'clock and 33 minutes p.m.) the Senate adjourned until Tuesday, October 19, 1971, at 11 a.m.

NOMINATIONS

Executive nominations received by the Senate October 15, 1971 (under authority of the order of October 13, 1971):

DEPARTMENT OF JUSTICE

Scott P. Crampton, of Virginia, to be an Assistant Attorney General, vice Johnnie M. Walters, resigned.

CONFIRMATIONS

Executive nominations confirmed by the Senate October 15, 1971:

COMMUNITY DEVELOPMENT CORPORATION

Samuel C. Jackson, of Kansas, to be a member of the board of directors of the Community Development Corp.

NATIONAL CORPORATION FOR HOUSING PARTNERSHIPS

Walter James Hodges, of Virginia, to be a member of the board of directors of the National Corporation for Housing Partnerships for the term expiring October 27, 1972.

WITHDRAWAL

Executive nomination withdrawn from the Senate October 15, 1971:

DIPLOMATIC SERVICE

Michael K. Lyons, of New York, to be a Foreign Service officer of class 8, a consular officer, and a secretary in the diplomatic service of the United States of America, which was sent to the Senate on July 28, 1971.

EXTENSIONS OF REMARKS

IMPORTANT NEW TRANSPORT SYSTEM STARTED IN MORGANTOWN, W. VA.: SECRETARY VOLPE, SENATOR BYRD, GOVERNOR MOORE, AND REPRESENTATIVE STAGGERS SPEAK AT GROUNDBREAKING

HON. JENNINGS RANDOLPH

OF WEST VIRGINIA

IN THE SENATE OF THE UNITED STATES

Friday, October 15, 1971

Mr. RANDOLPH. Mr. President, on October 9 ground was broken in Morgantown, W. Va., to start construction of a new form of transportation facility that I believe will set a precedent for urban transportation throughout our country.

Under sponsorship of the Department of Transportation, a Personal Rapid Transit System will be constructed in Morgantown linking the downtown section of the city and two separate campuses of West Virginia University. This is an innovative program unlike any in the United States, and I am gratified that the Department of Transportation chose to locate it in a community that will provide a full test of its capabilities.

I was privileged to participate in the groundbreaking ceremonies along with Transportation Secretary John A. Volpe, my colleague from West Virginia, Senator ROBERT C. BYRD, Governor Arch A. Moore, Jr., and Representative HARLEY O. STAGGERS, in whose district Morgantown is located. President James Harlow, of the University, presided.

A comprehensive report of the program was written by John Raymond in the Huntington, W. Va. Herald-Advertiser the following day. His story said, in part:

The three members of the state's congressional delegation were instrumental in obtaining authorization and funding for the project.

Sen. Randolph said Saturday that while $21.4 million has been appropriated for the system in Fiscal 1972, the overall cost of the project may exceed $40 million before it is completed in 1976.

In his remarks at the ceremonies Saturday, Sen. Randolph said, "It is important that America never stop building," and equated the development of the PRT to the development of the airplane.

He said he believes it will prove to be the answer to the mass transit needs of cities for many years to come and also will be adaptable to many inter-city situations—specifically such areas as Huntington to Charleston.

Gov. Moore gave the welcoming remarks to the distinguished guests and several hundred WVU officials, townspeople and students who attended the ceremonies.

He too, was high in his praise of the project, which he said will focus national attention on West Virginia, and for the cooperation displayed by the congressional officials, WVU and local officials in working out the details of the project.

"This is one more example of progress in our state where we have taken so many strides in the last year to become first in the nation in several areas," said the governor.

"We are indeed on a course of progress and we are in command of our own destiny in West Virginia," the governor asserted.

In their addresses, Secretary Volpe and Senator BYRD reviewed the impor-