

RESEARCH AND DEVELOPMENT

HEARINGS

BEFORE THE

COMMITTEE ON MILITARY AFFAIRS

HOUSE OF REPRESENTATIVES

SEVENTY-NINTH CONGRESS

FIRST SESSION

ON

H. R. 2946

AN ACT AUTHORIZING APPROPRIATIONS FOR A
PERMANENT PROGRAM OF SCIENTIFIC
RESEARCH IN THE INTEREST
OF NATIONAL SECURITY

MAY 22, 23, AND 29, 1945.

Printed for the use of the Committee on Military Affairs



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1945

COMMITTEE ON MILITARY AFFAIRS

SEVENTY-NINTH CONGRESS

ANDREW J. MAY, Kentucky, *Chairman*

R. EWING THOMASON, Texas	WALTER G. ANDREWS, New York
OVERTON BROOKS, Louisiana	DEWEY SHORT, Missouri
JOHN J. SPARKMAN, Alabama	LESLIE C. ARENDS, Illinois
PAUL J. KILDAY, Texas	CHARLES E. CLASON, Massachusetts
CARL T. DURHAM, North Carolina	J. PARNELL THOMAS, New Jersey
CLIFFORD DAVIS, Tennessee	PAUL W. SHAFER, Michigan
JOHN EDWARD SHERIDAN, Pennsylvania	THOMAS E. MARTIN, Iowa
ROBERT L. F. SIKES, Florida	CHARLES H. ELSTON, Ohio
PHILIP J. PHILBIN, Massachusetts	FOREST A. HARNESS, Indiana
PAUL STEWART, Oklahoma	IVOR D. FENTON, Pennsylvania
ARTHUR WINSTEAD, Mississippi	J. LEROY JOHNSON, California
CHET HOLIFIELD, California	CLARE BOOTHE LUCE, Connecticut
JAMES A. ROE, New York	
MELVIN PRICE, Illinois	

JOSEPH R. FARRINGTON, Hawaii
E. L. BARTLETT, Alaska
JESÚS PIÑERO, Puerto Rico

JULIA WATTERSON, *Clerk*

CONTENTS

Statement of—	Page
Dr. Vannevar Bush, director, Office of Scientific Research and Development-----	2-29
Brig. Gen. William A. Borden, in charge of New Development Division, War Department Special Staff-----	31-42
Dr. Frank B. Jewett, president, National Academy of Sciences-----	42-70
Admiral A. H. Van Keuren, United States Navy, director, Naval Research Laboratory-----	71-79
Admiral H. G. Bowen, director, Office of Patents and Inventions, Navy Department-----	79-80
Letter from Karl L. Compton, chairman, Research Board for National Security-----	80-81

RESEARCH AND DEVELOPMENT

TUESDAY, MAY 22, 1945

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MILITARY AFFAIRS,
Washington, D. C.

The committee met at 10:30 a. m., pursuant to call, Hon. Andrew J. May (chairman) presiding.

The CHAIRMAN. The committee will please be in order.

Gentlemen, we have met this morning for hearings on H. R. 2946, a bill authorizing appropriations for a permanent program of scientific research in the interest of national security. I will ask that the bill be placed in the record at this point.

(H. R. 2946 is as follows:)

[H. R. 2946, 79th Cong., 1st sess.]

A BILL Authorizing appropriations for a permanent program of scientific research in the interest of national security

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to enable the National Academy of Sciences, through a research board for national security consisting of representatives of the Army, representatives of the Navy, and civilians of outstanding accomplishments, established by agreement between the Secretary of War the Secretary of the Navy, and the President of the National Academy of Sciences, to provide for scientific research and advancement determined by such board to be desirable in the interest of national security, there are authorized to be appropriated from time to time to the National Academy of Sciences such sums as may be necessary. All experiments and other projects hereunder shall be carried out pursuant to contracts or other arrangements made by the National Academy of Sciences with individuals, educational and scientific institutions, industrial organizations, and other public and private agencies, determined by the board to be appropriate.

SEC. 2. Funds appropriated pursuant to this Act shall be paid out on vouchers signed by or under the direction of the President of the Academy, and no expenditure of any such funds by the Academy shall be subject to review, audit, or settlement by any administrative or accounting officer or agency of the Government.

SEC. 3. The National Academy of Sciences shall report from time to time (not less frequently than semiannually) to the Committees on Military Affairs and Naval Affairs of the Senate and House of Representatives, respectively, with respect to its expenditures under this Act.

The CHAIRMAN. The Chair desires to say to the committee and to the public that this proposal is designed to establish a board for the purpose of studying and developing scientific means for the defense of the United States in time of peace. The Postwar Military Policy Committee, set up by a resolution of the House of Representatives, has held considerable hearings, copies of which were furnished to the members of this committee several days ago, for the purpose of allowing you to have an opportunity to review those hearings. As the Chair sees the situation, those hearings started out on the subject of

surplus property, but terminated with consideration of the problem that we have here. That committee made a recommendation of approval of the bill that we are considering here, with a slight amendment.

The Chair, as chairman of this legislative committee, feels that those hearings will be helpful to the committee and that is the reason why he suggested that you read them. The Chair, as well as other people interested in the problem, knows also that this is the legislative committee that must write the legislation and determine the mechanics of the organization that is to be set up. What I want this committee to do is to attend these hearings because three-fourths of the Military Affairs Committee are not members of the Postwar Military Committee; therefore, unless you attend these hearings, you will have to rely on a reading of the hearings of both the Postwar Military Policy Committee and this committee.

I should like to confine our hearings here today to the simple, straight proposition of scientific research and development for peacetime national security and/or security in case of war. I do not want anyone to get the idea that we are starting out to set up a military institution in the United States. What we are trying to do is to be prepared, as I understand it, with the latest developments and the latest discoveries of the scientific minds of the country which may be utilized as the means of development, through industrial concerns, of whatever we may need to defend ourselves with in the future, with the hope that we shall never have to defend ourselves against anybody.

With that statement, I should like to start the hearings by calling as our first witness Dr. Vannevar Bush, Director of the Office of Scientific Research and Development. I will ask Dr. Bush to confine his statement, as much as possible, to a discussion of H. R. 2946. Of course, doctor, that means you may make any statement you feel is appropriate to be made, and the committee will be glad to hear you.

STATEMENT OF DR. VANNEVAR BUSH, DIRECTOR, OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

Dr. BUSH. Mr. Chairman, I have here a brief statement which I have submitted to the Bureau of the Budget, but there has not been sufficient time for me to be advised what relation my remarks may bear to the program of the President.

Mr. JOHNSON of California. Mr. Chairman, I wonder if Dr. Bush would state his qualifications for the record.

Dr. BUSH. I shall be very glad to. I am Director of the Office of Scientific Research and Development. I shall outline in a moment how that organization was formed and what it does. I think that is my primary qualification for this purpose.

We are entering upon days of crucial importance to the Nation. They are particularly crucial in the Far East. The bitterest stages of the struggle in the Pacific are ahead. That struggle must be ended with victory in the quickest possible time and with the least cost in Allied lives.

These days are crucial, too, in Europe. As one of the prizes of victory, ours is the responsibility, along with our allies, for restoring a continent to self-respect and to a capacity for self-help, while, at

the same time, making certain that the specter of German aggression shall not arise again. These days are, in fact, crucial over the whole face of the globe. Men and nations everywhere must somewhere find the wisdom, the strength, the understanding and moral purpose to work together in the job of building for peace as they did so magnificently during war.

Here at home the challenge to wise statesmanship is particularly keen. This Nation is going to be sorely tried in many ways as it forges out vital policy in many fields. Peace is not a passive state. Peace, like war, must be waged. The time has come when aggressive and affirmative steps toward waging peace must be taken.

It seems to me that our first responsibility in this regard is to perpetuate the partnership with our allies which is, in many ways, the proudest achievement of the war. This is a grave responsibility. It will call for great courage and perseverance. It will require more than mere affirmations of intentions, more than expressions of high hopes. It will demand action. Adjustments in many of our traditional monetary and trade relations policies will be required if we are to make a genuine effort toward a peaceful partnership of nations. It is the Congress which must make these adjustments and take this action.

Yet, it is not of these things that I wish primarily to speak. I mention them only so that we may keep in full perspective the problem with which I am most concerned this morning. That problem is the establishment of a positive program to insure military preparedness for this Nation at all times. Such a program is not inconsistent in any way with the development of a peaceful family of nations cooperating to the fullest. Such a program is essential, moreover, unless we wish this Nation to be in perpetual peril from a sudden, ruthless, and devastating aggression which could completely extinguish our liberties.

In keeping this Nation vigorously able to defend itself, there is no more important factor than that of scientific research enthusiastically and energetically pursued. Both the nature of war and the strategy of war have been changed by science and research. Even more radical changes in the tactics of war are in prospect when the developments of our laboratories become known to all armies. It is exceedingly important that we keep fully abreast of these developments in the future. Continuing scientific research is, therefore, essential if we are not to be hopelessly outclassed in technology, weapons, and equipment. This continuing scientific research, however, need not be, and, in fact, must not be confined to research on military problems alone. The primary objective should be a fully developed, well-rounded, and healthy science under a democratic regime. It is the continuing contributions to fundamental knowledge by healthy basic research which furnishes the best scientific preparation for peace, as well as for war.

I welcome, therefore, H. R. 2946, which is before this committee today. It is evidence that this Congress is aware of the enormously responsible role which continuing scientific research must play both in the development of a strong industrial society and in securing our national existence against the sudden onslaught of war. H. R. 2946 is the first of what must be a long series of constructive steps toward

building a military organization which will function with maximum effectiveness in times of peace. This will demand the very best constructive effort that the Congress and the people of this Nation can bring to bear. In furtherance of this effort, I am particularly happy to make myself, and the unique experiences of the organization with which I have been connected during this war, fully available.

The Office of Scientific Research and Development was created by Executive order of the President in June 1941. For a year previous to that, however, the organization had existed under the name of the National Defense Research Committee, created by the Council of National Defense. In June of 1941, the National Defense Research Committee was joined with the newly created Committee on Medical Research, and together they formed the Office of Scientific Research and Development. The essential function of the OSRD, as prescribed in the Executive order, was to initiate, support, and coordinate research on problems related to the national defense. We have taken that directive literally.

We have initiated research on a variety of problems, some of them never before subjected to concerted scientific attack. We have supported with funds, advice, and personnel the research programs undertaken by others, both in and outside of the Government. We have coordinated research programs and arranged for the vital exchange of scientific and technical information among scientists in both private and public laboratories. We have arranged for exchanges of technical information with our allies. We have explored the unknown on a scale larger than that ever before attempted by this Government in peace or in war. As of March 31 of this year we had entered into 2,196 contracts with 441 institutions, involving the expenditure of nearly five hundred million dollars.

Our activities range from the little improvements of the humble things such as the nonshrinkable socks for our soldiers to the great and dramatic developments such as radar, rockets, and devices not yet known to the public but of immense importance to the success of our troops.

We have come a long way in 5 years. This war has been not only a battle of men and machines, but a battle of technology. At the outset, because the Nazis had been preparing for war for many years, the Germans were ahead of us technologically. But their superiority in technology was not good enough. Had it been only slightly greater, however, or had it extended to one or two additional fields of scientific accomplishment, Nazi Germany would not now be prostrate. In the flush of our enormous superiority, technical and otherwise, during the closing months of the campaign in Europe, we are inclined to forget the exceedingly close margin by which we and our allies clung to survival in the dark days of 1940, 1941, and 1942. We should not forget that if it were not for the technical superiority in radar which the British enjoyed in 1940, the Battle of Britain might have been irretrievably lost. We should not forget that if it had not been for the outstanding achievements of our scientists in antisubmarine warfare, the devices and equipment which preserved the supply lines essential to our victory would not have been produced.

In spite of the dark beginnings of 1940 and 1941, the United Nations, by dint of one of the most intensive scientific efforts, rapidly

closed the technological gap between themselves and the Germans. We soon surpassed the Germans scientifically in the fields which were essential to our victory. We have known this for some time. The full extent of our technological superiority over the Germans, however, is only now being completely established as we gain access to German laboratories and German arsenals. Allied science has reason to be proud.

The greatest sources of our strength in the effort to mobilize scientific research in aid of the armed forces were essentially two: In the first place, the OSRD received its funds directly from the Congress. I may say right now that the OSRD has always received the most informed and understanding treatment at the hands of Congress. The Congress has always been quick to appreciate the importance of what we have done and the extent of our needs. This is especially noteworthy, since much of what we have done has had to be maintained in the strictest of secrecy, and since all research is speculative and frequently shows so few immediate and tangible returns. The second source of the OSRD's strength resided in the fact that we reported directly to the President, as Commander in Chief. During the past 5 years, President Roosevelt showed a keen sense of the nature of science and its needs.

If it were not for these two factors, the OSRD could not, in my judgment, have effectively mobilized scientific research during these war years. These then I put down as two basic principles for successful Government participation in scientific research. First, the research organization must have direct access to Congress for its funds; second, the work of the research organization must not be subject to control or direction from any operating organization whose responsibilities are not exclusively those of research.

Industry learned a long time ago that it was fatal to place a research organization under a production department. Research and an operating responsibility, such as production or sales, are incompatible. An operating group is under the constant urge to produce in a tangible way, to meet existing standards, and existing schedules. An operating group has neither the time nor the inclination for research. An operating group is judged by production standards. Research, however, cannot be judged by production standards. Research is the exploration of the unknown. It is speculative and uncertain. It cannot be standardized. It succeeds, moreover, in virtually direct proportion to its freedom from performance controls, production pressures, and traditional approaches.

It is fundamental, accordingly, that research on military problems should be conducted, in time of peace, as well as in war, in part by civilians independently of the Military Establishment. The armed services exist to fight. It is their primary responsibility to train the men, make available the weapons, and employ the strategy that will bring victory in combat. The armed services cannot be expected to be experts in all of the complicated fields which make it possible for a great nation to fight successfully in total war. There are certain kinds of research—such as research on the improvement of existing weapons—which, of course, can be done best by military men within the Military Establishment. The job, however, of fundamental scientific research should be entrusted to the civilian scientists who are best trained to

discharge it thoroughly and successfully. It is essential that both kinds of research go forward. We have just learned, for example, that one of the primary reasons why German science failed to maintain its superiority over the Allies is because in the early stages of the war German scientists were diverted from fundamental research to a concentrated effort toward the improvement of existing weapons.

An able research scientist is the product of the intensive and specialized training of many years. The military man, who must acquire many other skills, cannot acquire that degree of specialization and training in science which is essential if broad and important scientific advances are to be made on military matters. Nor is the military tradition or the position of the military man within the services conducive to fundamental scientific research. The scientist must be free from restrictive controls. He must not be under the compulsion to produce immediate results in order to obtain advancement. Moreover, there must be parallel research attacks on a given problem by several groups approaching from different points of view. This has been demonstrated times without number in industry and in our own war experience. In developing a land-mine detector, for example, we found it necessary to have four different groups tackle the problem simultaneously from different angles.

Lest there be some misunderstanding, I should make it completely clear that the participation of civilian scientists in research on military problems neither should, nor can, supersede research by the armed services themselves. The civilian scientists are simply partners in the research effort. They should supplement the research done within the armed services. As I pointed out in my testimony before the Select Committee on Postwar Military Policy last January, however, numerous changes in the organization of the Army and Navy are necessary if research within the services is to be effectively organized.

The bill which this committee is now considering, H. R. 2946, presupposes the establishment within the National Academy of Sciences of a Research Board for National Security, composed of outstanding civilian scientists, together with representatives of the Army and Navy. Such a board was originally recommended last fall by an impartial group of civilians, Army officers, and Navy officers, headed by Charles E. Wilson, then Executive Vice Chairman of the War Production Board. In this regard also H. R. 2946 follows the recommendation of the House of Representatives Select Committee on Post War Military Policy, under the chairmanship of Representative Woodrum. It is generally agreed that through the medium of such a board the armed services will be able successfully to enlist the aid of civilian scientists in active partnership in research on military problems.

The proposed bill and the recommendations of Representative Woodrum's committee go further, however, than the original recommendation of Mr. Wilson's committee in two respects. First, the bill proposes that the Research Board for National Security should be financed directly by the Congress. Second, the language of the bill clearly infers that the Board shall independently determine the research projects to be studied. As I read the bill, therefore, the Research Board for National Security will be able to obtain, directly from Congress, independent funds with which it may initiate re-

search, of its own choice, on military matters. In both of these respects, the bill materially improves on the original proposal.

I have consistently favored the establishment of a Research Board for National Security. I have favored it, however, as an interim measure designed to bridge the gap between the termination of the OSRD, an emergency war agency, and the eventual creation of an independent research agency under mandate from the Congress. I believe that the Research Board for National Security must be an interim measure since the shape of the over-all postwar organization of Government both in its civilian aspects and particularly in its military aspects, is far from clear.

The problem is one of timing. If we now knew with any certainty what the postwar military structure of the United States would be, if we now knew whether the two services are to be linked with each other into one over-all organization, if we knew whether the Air Forces were to fit in, and whether the Joint Chiefs of Staff were to continue, if we knew these things and more, it might be possible to eliminate the interim step and move directly to the establishment of an independent and permanent research agency. In particular, before we can intelligently construct a permanent civilian agency for research on military problems we must know what the organization of research within the services is to be. Will it be recognized at the highest echelons? Will it have independence and support? Will the evolution of weapons be given the place within the services which its importance warrants? We must know these things, since the civilian research agency must be built so as best both to complement and to supplement the research organization of the services.

Similarly, we would be able to construct a more permanent organization for scientific research on military problems if we now knew what the over-all agency for research on nonmilitary matters within the Government was going to be. Some such nonmilitary research organization is clearly desirable. It is particularly important that we do not allow problems of military research to occupy a disproportionate number of our best scientists. A balance between purely military research and fundamental scientific research of general utility must be struck. A proper balance would place far the greater emphasis on the basic research which is primarily of peacetime importance to the health of our citizens, to industry, and to our national well-being. The balance must be set and maintained by the Congress.

The Government in previous peacetime years has not made the maximum use of science and scientific research. Greater use of our scientific resources must be made, not only to achieve military security but also to insure national progress. You will recall that President Roosevelt last November asked me to prepare a report containing my recommendations as to how science might be "used in the days of peace ahead for the improvement of the national health, the creation of new enterprises bringing new jobs, and the betterment of the national standard of living." I hope to submit such a report to President Truman in the near future, and I trust it will assist Congress in preparing a program of legislation which will aid in maintaining our industrial and national vigor for many years to come.

In my statement this morning I have confined myself largely to principles. The details of the bill which is before this committee are of lesser importance, in my mind, than is the observance of the prin-

ciples upon which I have commented; namely, an independent civilian agency with direct access to Congress for funds. When it comes to matters of detail, I believe that there is much to recommend an independent agency of the type proposed by Senator Byrd in his bill S. 825. Both H. R. 2946 and S. 825, however, as interim measures, meet the test of the basic principles which I believe to be of paramount importance.

I suggest that it would be well to recognize the interim nature in the legislation itself. I suggest also that, in either case, it would be well to provide for transfers from existing agencies to finance organizational expenses pending appropriations, in order to get started promptly.

The CHAIRMAN. Dr. Bush, I want to compliment you for sticking to the bill this morning, because you have completely stated the issue involved. Your statement is very convincing, to me at least. I do not know that any questions I might ask you would throw any further light on it. As I understand the measure, it is clearly an authorization proposal, to authorize Congress to appropriate funds for this organization proposed to be set up by the Army and Navy.

Dr. BUSH. Set up by the National Academy of Sciences, sir, at the request of the Secretaries of War and the Navy.

The CHAIRMAN. You already have such a board set up?

Dr. BUSH. That board has all been named. It has had preliminary meetings and is all ready to proceed as soon as the matter of its financing is clarified.

The CHAIRMAN. That has been done, of course, in pursuance of the Executive order?

Dr. BUSH. That was done, sir, in pursuance of the request from the Secretaries of War and the Navy and the President of the National Academy of Sciences to form such a board.

The CHAIRMAN. But there was an Executive order authorizing it before it was done, as I understand it?

Dr. BUSH. No, sir; there was no Executive order in that case. Of course, the OSRD has operated under Executive order for 4 or 5 years. That is the way in which OSRD was constructed. This board, however, is being formed simply at the request of the Secretaries of War and the Navy to take over and fill the gap when OSRD goes out of existence, which it is bound to do, being a temporary war agency, at the end of the war.

The CHAIRMAN. The proposal here, then, is to authorize direct appropriations for the use of the National Academy of Sciences, to be used through this board, rather than to have the money appropriated to the War and Navy Departments and then allocated to the Academy?

Dr. BUSH. That is right. That is correct, sir. I feel that that is a far preferable procedure.

The CHAIRMAN. There is one other thing I want to speak about here. What is the extent to which you cooperate with the civilian scientists of the country? Are many of them in the employ of industrial concerns, how do you propose to utilize their services, and to what extent do you propose to call on them for their services?

Dr. BUSH. I may answer that, sir, by stating how we have done that in the past 5 years under the Office of Scientific Research and

Development. The members of the National Defense Research Committee, which is the committee that has to do with new weapons, were appointed by the president. They consist of four civilian scientists, a representative of the Secretary of War, a representative of the Secretary of the Navy, and the Commissioner of Patents. Also, the President of the National Academy of Sciences is a member of that committee. That committee in turn operates through divisions and sections, which it forms by gathering together the outstanding scientific men of this country, largely on a voluntary basis, serving without compensation, to work in the fields of their specialists. There is, for example, a very important division on the whole subject of radar. We have drawn those men from the universities and the laboratories of industry indiscriminately. When we draw them for voluntary war service, they become officials of the United States Government, of course, and act as such in formulating the programs to be carried out.

The National Academy of Sciences, in its interim operations under this arrangement, will similarly call upon the scientists of the country for a great deal of voluntary service on the various boards or panels or committees which it may form on various subjects, just as the Academy in time of peace operates in connection with its regular affairs. You will hear, I believe, from Dr. Jewett, who is President of the National Academy of Sciences. He will be in a much better position than I to tell you how they propose to operate.

The CHAIRMAN. Now, Doctor, one more question on this subject of the plans to be drawn between strictly military research and scientific research for the civilian needs of the country. Will you comment on that briefly, telling us what you have in mind?

Dr. BUSH. Yes, sir. During the period of the war, we have quite properly drawn in every scientist of competence whom we could get hold of to work on two matters: the development of new weapons and the advancement of war medicine. That has produced results. It has produced results, however, at a very large cost—a cost in the progress of basic science—for these men have been called away from their normal pursuits in the advancement of basic, fundamental science to take part in the applications of science to military matters. That is the proper way in which to fight a war. We must recognize, however, that it leaves us a great scientific deficit. On the other hand, when we return to peace, we can place more emphasis on the fundamental, basic sciences on which the prosperity of this country, from a scientific standpoint, rests. There must be, therefore, in the days of peace, a proper balance between the pursuit of science for its own sake and the pursuit of science as it applies to military matters. That plan in the days to come must be in the last analysis determined by you gentlemen.

The CHAIRMAN. Mr. Sparkman, have you any questions?

Mr. SPARKMAN. Yes, Mr. Chairman, I have a few questions I should like to ask of Dr. Bush.

Dr. Bush, as I understand it, you recommend H. R. 2946 as it is drawn, or would you recommend some changes?

Dr. BUSH. I would recommend only one change, sir, a rather mild one, or moderate one—two, in fact. I think it would be well if it were definitely recognized in the legislation that it is expected that

this is an interim measure; and second, in order that this may move rapidly, I think it would be well to provide in the legislation itself, so that there may be no misunderstanding, for transfers of funds from the Army and Navy to this new organization to take care of its organizational expenses pending the time when it can come before you gentlemen for appropriations, because a great deal of time has elapsed, and I feel that it is essential that this work be started promptly. This board should be in full vigor by the time the end of the war comes, whenever OSRD necessarily winds up its affairs.

Mr. SPARKMAN. In other words, you would like to see a continuing operation? You would like to see it in operation continuing right on?

Dr. BUSH. I would not like to see the ball drop between two outfielders. We are carrying the ball during the war as a wartime organization. We must make our plans to go out of existence. OSRD, which has operated well as a wartime organization, is not fully adapted for peacetime operations. It was formed under Executive order, but the permanent research structure should be formed by the Congress under legislation. Such a permanent organization should include not only military research, but research for civilian purposes as well. That whole matter is under study. It will take a long time to work it out. There is danger that the ball will in the meantime drop between two outfielders, and we ought to have this interim organization fully operating to carry the ball in the meantime.

Mr. SPARKMAN. Do you think H. R. 2946 as drawn provides for that nonmilitary research?

Dr. BUSH. No, sir, it does not. I think the whole bill makes it quite clear that this body will use its own initiative in providing only for the military research that it feels to be desirable to supplement that of the Army and the Navy—

Mr. SPARKMAN. I was just wondering about the form of the clause: to provide for scientific research and advancement determined by such Board to be desirable in the interests of national security—

I was wondering whether the fact that that is linked to the— agreement between the Secretary of War, the Secretary of the Navy, and the President of the National Academy of Sciences—

would not be considered as restricting it to military purposes.

Dr. BUSH. Oh, yes; I think it should be.

Mr. SPARKMAN. Well, I thought you said in your statement that you wanted both military and nonmilitary.

Dr. BUSH. Oh, ultimately, sir, yes, without doubt; but not in this bill.

Mr. SPARKMAN. In the interim plan you would provide for— scientific research and advancement determined by such Board to be desirable in the interests of national security?

Dr. BUSH. Quite right. This board should do that.

Mr. SPARKMAN. I wanted to get that clear, because I was not clear on that.

Dr. BUSH. This board is entirely concerned with military research matters.

Mr. SPARKMAN. Are you Chairman of the OSRD?

Dr. BUSH. Yes, sir; Director of the OSRD.

Mr. SPARKMAN. Doctor, what do you estimate the annual cost of this to be?

Dr. BUSH. I would suggest you ask that question of Dr. Jewett, who is President of the National Academy of Sciences and who will follow me.

I can say very definitely that I feel strongly that it will be a very small fraction of the amount that is now being used by OSRD in the prosecution of war research.

Mr. SPARKMAN. In the OSRD is there any cooperative effort with similar agencies in other countries, in England, for instance?

Dr. BUSH. Yes, sir. We have had excellent scientific interchange with Great Britain and with the United Kingdom throughout the war. It has been so close that in some places it would be entirely impossible to determine whether the British or ourselves accomplished a particular advance. We worked closely together.

Mr. SPARKMAN. Was that particularly true of radar?

Dr. BUSH. It certainly was fully true with radar, and it was true in every other area of importance in which we worked. That, incidentally, has been a very valuable thing indeed. We have great respect for the British scientists, and the fact that we have interchanged has avoided unwise duplications and has also brought the entire team to bear on single problems of importance in a way that has been very effective indeed. We have been more effective in this war, I am sure, from a scientific standpoint because of the excellent interchange than we would have been otherwise.

Mr. SPARKMAN. As I understand your statement, you would not supplant the research that each department or each agency would do of its own accord?

Dr. BUSH. Do you mean the Army and the Navy?

Mr. SPARKMAN. Yes.

Dr. BUSH. No, sir; I would not.

Mr. SPARKMAN. In other words, you think they ought to continue their research but that there ought to be an over-all body?

Dr. BUSH. Quite right. I feel our experience in this war has shown clearly the desirability of that step. The OSRD was not set up to supplant, but to supplement, the work of the Army and the Navy. The initiation of research by independent civilian scientific men, by stepping out into borderlands where the Army and Navy would not otherwise go, has been very valuable.

I feel that this new agency should similarly supplement the work of the Army and Navy but that it should not carry on research which can be carried on by the Army and Navy themselves, and certainly it should not take over the entire burden.

Mr. SPARKMAN. That is all, Mr. Chairman.

The CHAIRMAN. Mr. Andrews?

Mr. ANDREWS. I have no questions.

The CHAIRMAN. Mr. Clason?

Mr. CLASON. Referring to section 2 of this proposal, as nearly as I can make out, once the money has been appropriated, the Government never again would have any control whatsoever over the expenditures, would it?

Dr. BUSH. I believe it has been proposed, sir, that this section 2 be modified so that the General Accounting Office will have supervision in the usual way. I would be fully in accord with that. I believe it would be necessary for the protection of the Academy, for one thing, that the account should be properly audited.

The CHAIRMAN. I think that the present section 2 should be stricken out of the bill.

Mr. CLASON. On page 4 of your statement you said :

As of March 31 of this year we had entered into 2,196 contracts with 441 institutions, involving the expenditure of \$500,000,000.

Dr. BUSH. That is right, sir.

Mr. CLASON. As I understand it, once this bill is passed, you would never have to come before a legislative committee again in order to give any information as to what you are doing. You will deal directly with the Appropriations Committee; is that right?

Dr. BUSH. This bill will, of course, in no way affect the operations of the OSRD, about which I was speaking on page 4. We will still operate under our executive order and will continue in full operation as long as the war lasts.

Mr. CLASON. All right; I agree with that. But under this bill you are now coming in under legislation; and as I read it, this bill permits the National Academy of Sciences, once the bill is passed, to enter into any agreement it wants to and thereafter look only to the Appropriations Committee for direction as to what it shall do.

Dr. BUSH. I presume it would do that in the opposite way. It would present its plans, ask for this appropriation, and then proceed under its appropriation.

Mr. CLASON. It would never again go before a legislative committee to explain what it is going to carry out or to receive any direction; is that right?

Dr. BUSH. I do not see that that is provided in the bill, sir, no. But a legislative committee may always call upon an agency for information and may always inquire into the operation of an agency with a view to further legislation, if necessary.

Mr. CLASON. Do you think it is good legislation for an organization outside the Government or an agency of government to draft its own purposes, plans, and programs, and then not seek to have them in any way checked by a legislative committee of Congress?

Dr. BUSH. There is in the bill that has been introduced in the Senate by Senator Byrd a provision for annual reports to the Congress through the President.

Mr. CLASON. Annual reports or expenditures made and the programs and accomplishments.

Dr. BUSH. I think it might be desirable to include that also in this case.

The CHAIRMAN. Read the last section of the bill.

Dr. BUSH. Yes; it is there.

Mr. CLASON. That does not really answer my question. You seek by this bill to avoid any contact with a legislative committee of Congress once this bill is enacted.

Dr. BUSH. I should like to make one thing clear, Mr. Clason: I am not seeking anything under this bill.

Mr. CLASON. Well, somebody is.

Dr. BUSH. This proposal was made first by the Wilson committee, of which I was not a member. This proposes setting this organization up in the National Academy of Sciences as a science research board for national security, of which I am not a member. I am appearing because I am Director of the Office of Scientific Research and Development, which office is to out of existence.

I am interested in the bill and I believe in its objectives, but I am not personally concerned.

Mr. CLASON. I agree that you are not personally concerned. We all know of your high reputation, Doctor. However, we are considering legislation which will govern the expenditure of millions of dollars in the future and may have a lot to do with the conduct of the Army and Navy and of other programs of the United States Government. Do you as a citizen and a witness here today think it wise to have passed a bill establishing an agency of the United States which once it is established no longer has to receive any sanction or any direction from a legislative committee, but thereafter shall depend solely for its future on what it is able to take out of the Appropriations Committee, without submitting any of its plans or programs to the legislative committee?

Dr. BUSH. Of course, the problem of what committees of Congress have jurisdiction over particular matters is a question primarily of congressional organization. I would like to say, however, that I very much hope, when we come to permanent legislation in regard to the organization of our Army and Navy after this war—the organization of our defense—that the research and development aspects will be given their permanent place in your consideration. I also hope that there will be at that time in the legislation you prepare adequate means for reviewing and coordinating research programs not only of the civilian agency that may then be established but also of the Army and Navy themselves.

Mr. CLASON. There is nothing in this bill to indicate that it is temporary. As I read the bill, this is permanent.

Dr. BUSH. I recommend that a word or two be put in there to indicate that it is temporary.

Mr. CLASON. Do you mean that there should be a termination date in this bill? As of what time would you suggest?

Dr. BUSH. I believe, sir, it will take about 2 years, in my estimation, before Congress comes to the point of enacting permanent legislation in regard to the organization of our national defense. If it makes greater progress and more rapid progress than that, it will be surprising. I believe that the hearings before the Committee on Post-war Policy have definitely shown that there are very important problems, indeed, that need to be examined into before such legislation can be prepared.

There has been proposed a single Department of National Defense. The question has been raised as to whether the Joint Chiefs organization should be continued. There is the question in regard to the Air Forces—whether we should have a separate Department of Air. Those problems are very far reaching and they are very difficult problems. I believe it will take 2 years before that whole matter can be thoroughly examined and legislation passed in this country.

At the same time that is done I hope very much that the composition of research and development within the services and, as well, in supplement to their work, will be very carefully considered as a part of the whole. I believe scientific research and development should be given a very important place within the services, for I think it is an important aspect of the whole problem.

This measure will provide a stopgap, interim procedure until the entire matter of national defense can be considered as a whole. I do

not believe that this organization will spend great sums of money. What it spends will be for you gentlemen to determine, but I do not believe that there is nearly the need for it to spend large amounts of money that there is for it to preserve continuity.

There has been developed during this war a provisional partnership between the military men of this country and the scientists—a very valuable partnership. We are producing results by joining the voice of the scientific men and the background of the military. That partnership should not be allowed to break. This proposal will preserve that partnership through the interim until we have some permanent set-up.

Mr. CLASON. As you now outline it, this would have a 2-year termination date, so how would it be any different from the present set-up? As I understand it, you are doing that same thing now by Executive order, and there is nothing to indicate that the Executive order will not be in existence for the next 2 years.

Dr. BUSH. There is one very definite difference, sir. The OSRD is doing only those things that are directly applicable to the prosecution of this war. This new body, when it is formed, can begin to take the longer look ahead toward the defense of the future. They are quite separate things.

The CHAIRMAN. As I understand this bill, it merely proposes to authorize the Appropriations Committee to make appropriations to the National Academy of Sciences.

Dr. BUSH. That is right.

The CHAIRMAN. As a law on the statute books it can be amended or rewritten at any time Congress thinks it needs to be rewritten.

Dr. BUSH. That is right.

The CHAIRMAN. So it is not a stopgap; it is a piece of legislation.

Dr. BUSH. That is right, sir.

Mr. CLASON. I think the doctor particularly characterized it as a stopgap. He wants it for only 2 years. He wants it as a law to function between the present Executive order and the time in the future—say, 2 years from now—when Congress will pass another bill which will give the National Academy of Sciences, or whatever it is called, permanent status of some sort, with directions as indicated in the law at that time. In other words, this is stopgap legislation for 2 years.

Dr. BUSH. I do not know whether it is to be for 2 years or some other period. My point is it should not become frozen. You gentlemen may find the National Academy of Sciences to be the place in which you would like to carry this on permanently, but the program we are now carrying on, with all the uncertainty there is with respect to the future of military organizations, will need to be changed.

Mr. CLASON. As I get this picture, what you are trying to do by this legislation, doctor, is to expand the field in which the National Academy of Sciences is now working?

Dr. BUSH. Yes, sir. This will expand their field.

Mr. CLASON. That is the purpose of this bill today, because, with that exception there is no other gain from the present Executive order to be secured through this legislation?

Dr. BUSH. Oh, I think there is, sir.

Mr. CLASON. What is it?

Dr. BUSH. It is clear from the Executive order under which we are now operating that we are an emergency agency. We have to make our termination plans, and that we are doing at the present time.

This provides that the Academy expand its operations to carry on, at the request of the Secretaries of the War and the Navy, certain contacts and certain fundamental research in military matters during the period after the OSRD ceases to exist.

Mr. CLASON. Then, for my information—perhaps some of the others have got it, but I have missed it—what functions do you intend to carry on during the next 2 years outside the field of Army and Navy research—military research? Do you intend going into cancer research?

Dr. BUSH. No sir. It is proposed under this bill that the National Academy of Sciences engage only in military research.

Mr. CLASON. You say you wish to spend that time during the next 2 years in which the National Academy of Sciences is operating, on military research.

Dr. BUSH. The National Academy is not doing military research at the present time in any such way as this provides. The National Academy of Sciences is an advisory agency to the Government on scientific problems. It does a great deal of such advisory work during peacetime and wartime. This provides in addition that they would set up this board, and this board would in turn carry on certain research in military matters.

Mr. CLASON. What are you going to do beyond military matters with this legislation? It is not limited, as I understand your answer, to military matters. You would take up other matters?

Dr. BUSH. This legislation is limited to military matters.

Mr. CLASON. This is limited to military matters?

Dr. BUSH. Yes, sir. That is the request that the Secretaries of War and the Navy made of the Academy.

Mr. CLASON. On page 6 of your statement you said:

First, the research organization must have direct access to Congress for its funds; second, the work of the research organization must not be subject to control or direction from any operating organization whose responsibilities are not exclusively those of research.

In other words, what you are asking for is an absolutely independent agency to be established by legislation under this bill?

Dr. BUSH. Yes, sir.

Mr. CLASON. Let me cite an example of what I have in mind. Just before this war broke out, there were several semiautomatic rifles under consideration for the Army—the Peterson, the Johnson, the Garand, and perhaps others. If there is an organization of this type with scientists in it, will they be checking on matters of that kind?

Dr. BUSH. I do not think they will, sir, for two reasons: In the first place, there is no idea in any part of this that I have ever seen, that places this body in a position of reviewing or examining into actions of the Army and Navy in their own programs; second, the development of rifles is just the type of improvement of existing weapons which the Army and Navy themselves could best carry on.

Mr. CLASON. What is there in this bill that limits the scope of this new organization so that it will not be interfering with the Army and the Navy?

Dr. BUSH. There is nothing in the bill, sir, which calls for interference with the Army or the Navy. This bill in no way interferes with the authority of the Army or the Navy. There is, moreover, the good judgment of the distinguished board. I would be quite willing to rely on their judgment in such matters. I would be quite sure that they would not attempt to interfere with the Army and Navy in their programs.

Mr. CLASON. Then, you would expect the Army and Navy to continue to carry out work in their research laboratories throughout the country, either in their armories or their model ship basins?

Dr. BUSH. Most certainly.

Mr. CLASON. You cannot tell us how much money is involved in this bill?

Dr. BUSH. No, sir.

Mr. CLASON. Do you have any idea?

Dr. BUSH. I think Dr. Jewett may be able to give you an estimate on that. I believe he will appear just after I have finished.

Mr. CLASON. Would you expect this agency ultimately to go into private industrial fields and try to improve technological methods, or whatever you call them, of the industrial development?

Dr. BUSH. I would not expect them to, sir, for exactly the same reasons I just gave. This Board is set up for military research. The Board consists of some very distinguished scientific gentlemen and some Army and Navy officers of good judgment and excellent standing, with whom I have had long association. I am quite sure that that board can be depended upon to stay within its appropriate field of operations.

Mr. CLASON. There is one other question; then I shall be finished. Will you permit persons connected with this organization to receive salaries both from the United States and from other operations of the individuals?

Dr. BUSH. In this new Board, sir?

Mr. CLASON. Yes; employees of any type. In other words, is the Government, through this agency, going to be in a position, once this bill is passed, of hiring persons and paying them salaries at the same time they are receiving salaries from large industries or corporations or private individuals throughout the country?

Dr. BUSH. Members of the Board themselves, sir, are without compensation voluntarily.

Mr. CLASON. You could not expect to have outstanding persons on Government salaries as compared with what scientists would be able to make in private employment.

Dr. BUSH. This Board is under the Academy, and its employees would be employees of the Academy, not the employees of the United States Government.

I think there is no danger whatever of any improper relationship between men who would be brought in on this work as between the interests of the Government and the interests of their universities or industrial organizations. The reputation of the Academy is the guaranty of that. It has operated for many years, ever since the Civil War, in fact, as the advisory agency to the Government on scientific matters. It has been very careful, and always will be very careful, that the men who serve in advising the Government are not men who have ulterior interests that might warp their judgments.

Mr. CLASON. The answer is, then, that they would get United States Government funds turned over to the agency in pay checks from the Academy of Sciences, along with checks from other sources, in payment for their services?

Dr. BUSH. I do not know what you are thinking of in that connection.

Mr. CLASON. I am thinking of somebody on the pay roll of a corporation or a university receiving a check from them each month, or say, even during the year, and also, at the same time, receiving checks from the United States Government for services rendered to the Government.

Dr. BUSH. There is nothing in this bill which authorizes any such payments nor do I believe that the question will arise, sir.

Mr. CLASON. But do you think that should be permitted?

Dr. BUSH. I do not believe a person should be paid for the same work from two sources nor do I think it will occur under this bill. There are also a good many laws on the books against that sort of thing.

I do not believe the question will arise of men acting in dual capacities.

Mr. CLASON. The answer is that in one way or the other the United States Government will furnish funds, and then the professors in universities and scientists on corporation pay rolls will receive Federal money?

Dr. BUSH. Yes, sir; Federal money will be furnished to scientists in universities and industry under contract. My organization has furnished \$500,000,000 in the past 5 years for that very purpose; and if it had not been for that organization and that money, we would still be at war with Germany.

Mr. CLASON. The Government, then, would not have any chance to determine how much money a particular scientist who was performing work would get? We have had that in connection with contracts with the Government in connection with engineering research through organizations. One man in Connecticut got more than \$500,000 in 1 year by just getting a percentage on the basis of the fact that he was an engineer.

As I see this proposition, there is no safeguard in here to prevent some individual from receiving in the course of a year a fairly large sum of Government money indirectly. It is Government money, nevertheless.

Dr. BUSH. There are many safeguards against the kind of thing you have in mind. During the past 5 years the Army, the Navy, and my organization have all been contracting with industry and the universities for research and development as well as for production. The usual administrative controls apply, of course, including reviews by the Appropriations Committees and the General Accounting Office.

In my own organization, the OSRD, we have carried on our own research and development entirely at cost. We have purchased contracts in addition. But our research and development has been carried on at cost. Universities and industries have carried on research and development programs without profit. We have also had the principle, in connection with men whom we would hire, that the pay rolls paid by our contractors must be in accordance with what is reasonable and proper at the time. We have used great care to examine that at every point, sir. We have entered no cost plus a percentage of

cost contracts. I believe that if you will examine it in detail, you will find that never was Government money spent any more efficiently than it has been in the last 5 years under my organization. I give you the same guaranty as far as this organization is concerned. The scientists of the country, joined with the military men in this organization, will have the country's interests at heart at every point.

Mr. CLASON. I appreciate your statement. I realize that you are outstanding among American scientists, and I certainly am pleased with what you are doing.

The CHAIRMAN. The National Academy of Sciences was established in pursuance of an act of Congress?

Dr. BUSH. Yes, sir.

The CHAIRMAN. What was the date of that act?

Dr. BUSH. It was just after the Civil War; March 3, 1863.

The CHAIRMAN. What this bill proposes to do is to authorize the National Academy of Sciences to receive appropriations through Congress directly instead of going through the Army and Navy?

Dr. BUSH. For one explicit purpose; yes, sir.

The CHAIRMAN. That is all.

Have you any questions, Mr. Kilday?

Mr. KILDAY. I have no questions.

The CHAIRMAN. Mr. Durham?

Mr. DURHAM. I am glad to hear you make the statement, of course, that you will continue the operations of the institution. I do not see how it is possible to operate in any other way, because if you rob all the institutions of the country of their best scientists you will interfere with the existence of those universities.

I feel that there is a possibility of saving the Government money under this procedure. I would like to know whether your organization has to pay any royalties or fees, or anything like that to get any of these scientific developments that you use in the war effort.

Dr. BUSH. My organization has never paid royalty on a patent. For example, to be perfectly clear, we are concerned with research and development, not with production, not with procurement. We do quite often make experimental lots of material for extended field tests. We do set up the initial pilot plants and put new plants into production on this Army and Navy procurement. All questions of possible patent royalties under the procurement programs are the problems of the Army and Navy in connection with their regular procurement. They do not come into our research and development problems. As a matter of fact, I do not know of any case throughout the war where we have refrained from developing a particular weapon or where we have pursued a particular weapon because of the patent aspect that may reside in that particular thing. That has largely been out of our picture.

Mr. DURHAM. That is all.

The CHAIRMAN. Mr. Martin?

Mr. MARTIN. I should like to clear up this point about the present Executive order under which you are operating. Does that last for 5 years or is that for the duration?

Dr. BUSH. I think it is for the duration plus 6 months. It is part of the Office for Emergency Management and is subject to the same termination provisions.

Mr. MARTIN. Is it your idea that this bill should take up where that leaves off?

Dr. BUSH. Yes, sir. I think that this organization should be put into existence now, so that it will be a going concern when we disappear.

Mr. MARTIN. Then, this period of 2 years that you are referring to would date from now rather than from the end of the war?

Dr. BUSH. That was simply an estimate of the probable length of time before there would be permanent legislation. It may be 18 months or 5 years; I do not know.

Mr. MARTIN. In any case, though, you had in mind putting such a law as this into operation at once, without waiting for the expiration of the Executive order?

Dr. BUSH. Yes, sir; I think it should be done because this should be a going concern before we drop out.

Mr. MARTIN. Has the National Academy of Sciences ever handled Federal funds in the way that is contemplated under this bill?

Dr. BUSH. I suggest again that the President of the Academy could probably answer that better than I could. They have handled Federal funds many times by contract as they delivered advice to various Government agencies, but I know of no case in which they have received funds directly by appropriation.

Mr. MARTIN. As I get it from this bill, this is a little different approach, in that it is an appropriation to the National Academy of Sciences for management and control rather than as reimbursement to them for services rendered?

Dr. BUSH. It differs, yes, sir, from past practices.

Mr. MARTIN. In your opinion, would the National Academy of Sciences be an agency of the Government under the direction of the President in carrying out the provisions of this bill?

Dr. BUSH. Do you mean would they be technically an agency of the Government, subject to the usual—

Mr. MARTIN. Yes, sir. Is there any Federal control over them in the administration of the law? Are they an agency of the Government, or are they strictly on their own?

Dr. BUSH. They operate under a charter—a congressional charter.

Mr. MARTIN. Does that make them an agency of the Government?

Dr. BUSH. I think, sir, I will ask you to give that question to the President of the Academy.

Mr. MARTIN. I want to know what kind of critter we are dealing with here, its status, and how it functions. I think we should determine by legislation how far they have authority to act.

The CHAIRMAN. We will look into that.

Mr. MARTIN. I think we had better.

Dr. BUSH. I know your chairman has looked into that, but I have not to the extent I would like to.

Mr. MARTIN. That is what we are talking about here, and I want to know your ideas about it, as a witness. I notice in this bill that the expenditures are subject to review by this Board. There is a Board, I believe, referred to, having some degree of approval, a Board referred to in the early part of the bill.

Dr. BUSH. The Research Board for National Security.

Mr. MARTIN. Yes. That would presumably have some control over—

Dr. BUSH. That would have entire control, sir.

Mr. MARTIN. As I understand it, their word would be final on any point that the National Academy of Sciences might have to bring up or put into being. It must have the approval of this Board first?

Dr. BUSH. I think it is the other way around. This Board would be created by the Academy for this specific purpose.

Mr. MARTIN. Now, this Board would be an agency of the Academy?

Dr. BUSH. Yes, sir; it would be under the National Academy of Sciences, by appointment by the President of the Academy and by detail of officers from the Army and Navy. After the Board is established, it is my understanding that it would be completely an operating agency for this purpose.

Mr. MARTIN. Would the National Academy of Sciences be subject to the jurisdiction of the Comptroller General?

The CHAIRMAN. Not as this bill is written, but that can be stricken out.

Dr. BUSH. It is my understanding, sir, that that has been discussed, and there is an amendment proposed that would bring the Comptroller General in.

Mr. MARTIN. As I understand your answers to some previous questions, the National Academy of Sciences is going to operate under the authority contemplated here in the military field or the national defense field alone during this interim period?

Dr. BUSH. Yes, sir.

Mr. MARTIN. Those references in your opening statement to civilian developmental work have something to do beyond what is contemplated under this bill?

Dr. BUSH. Oh, yes, sir.

Mr. MARTIN. That is something still farther ahead, not contemplated under this bill?

Dr. BUSH. I have in preparation at the present time a report on that very matter. President Roosevelt last November asked me to get together a comprehensive report on the whole question of the relation of the Federal Government to scientific research in this country in the postwar period.

I have had four large committees working on that for several months. Their reports are now in my hands. I am writing a summary report at the present time, and I propose to submit that to President Truman as soon as it can be finished.

Mr. MARTIN. That is what you are referring to in your opening statement, that goes beyond the bill—another study?

Dr. BUSH. Very much beyond; yes, sir.

Mr. MARTIN. You can see from my questioning that we have a few fundamental matters to settle here before we plunge even into this bill and make this bill a law.

Dr. BUSH. Yes, sir.

Mr. MARTIN. You spoke about the National Academy of Sciences functioning under this bill and devoting its time to research rather than to the perfection of existing weapons?

Dr. BUSH. Yes, sir.

Mr. MARTIN. Your emphasis would be on research and not on the development or perfection of existing plans?

Dr. BUSH. Yes, sir.

Mr. MARTIN. Would your work under this bill, and with that restriction, have created the bazooka, or was that a perfection of an existing weapon?

Dr. BUSH. If I give you the history of how the bazooka was created, then you will know how it happened.

Mr. MARTIN. Could you just answer my question a little more briefly than that, without giving a history. Was the bazooka the development of a new weapon or the perfection of an existing weapon?

Dr. BUSH. The bazooka was the application to a new weapon of some very important scientific principles that were developed by the scientific groups, and it then became applied to a specific military purpose by close collaboration between the scientists and the military men.

Mr. MARTIN. And that would or would not come within the contemplation of the duties of this board as set up?

Dr. BUSH. This board would undoubtedly be concerned with similar fundamental scientific principles that would be similarly applicable to military weapons.

Mr. MARTIN. If there were no bazooka today, and you were yet to create the bazooka, that would be within the thought of this bill?

Dr. BUSH. It is my understanding that if there were no bazooka today, but the scientific principles which are the basis of that weapon had been developed and were vaguely known, in all probability this board when it was in existence and operating would be devoting its attention to just such scientific principles as those, in order that it might become definitely applied to a specific weapon by collaboration with the military.

Mr. MARTIN. When, and if, we undertake the perfection of an American version of the V-2 bomb, will that be within the realm of this board; or will that be the perfection of an existing weapon?

Dr. BUSH. It again involves both parts of the question. The development of long range flying bombs is an important matter for the future. It involves the development of aerodynamics, propulsion mechanism, and so forth. I understand that this board, as it is gathered together to discuss in a preliminary way what it proposes to do, would be concerned with the development of the scientific principles underlying some such weapon as that, whenever it felt that the development of those principles would result in military applications of importance. That would, therefore, be—

Mr. MARTIN. Even though that might technically be further development of an existing weapon?

Dr. BUSH. Most certainly, if it would lead to the further development of an existing weapon. But my point is that they would not be concerned, in all probability, with the specific design of the final weapon, the specific improvement of that weapon from one model to the next, because they would feel, as I do, that that could be better done by the military themselves.

Mr. MARTIN. In other words, you would not use this agency to decide whether or not the Garand is an improvement over the Johnson rifle or anything like that; or whether they are an improvement over the Springfield; or you could go on from there and be a still further improvement on that type of weapon. You are getting into the V-2 bombs, something that we have not got quite established yet, and are going to try to deal more in that field?

Dr. BUSH. Of, course, you realize, sir, that you are asking me questions about what policy a board will pursue, and I am not even on that board. But I am perfectly confident as I answer you, because I know that would be the point of view of a good, sound group of scientific men, and I know they are good, sound, scientific men.

Mr. MARTIN. I am not trying to determine what the policy should be; I am trying to find out what else you are thinking.

Dr. BUSH. That is entirely the point of view we have held so far. During the war, the OSRD has as an emergency matter not only laid down scientific principles; we have developed specific weapons right to the point of their use. But that is a wartime affair.

Mr. MARTIN. But as I gathered from your opening statement, you are hoping that this agency would develop this by research, connected up with that with which you have been so occupied during the actual war.

Getting over into the research end of the functions of this agency, it is your thought that this should be, under this bill, entirely restricted to defense matters. There is no thought of getting into this at all what Mr. Roosevelt spoke of last November—the civilian?

Dr. BUSH. There is certainly no thought in anyone's mind that this is anything but a supplement to the military in military research matters.

Mr. MARTIN. Now, getting into the military only, is it not possible for us to follow our usual procedure of peacetime in the military, of limiting the extent of the authorization, not only as to time but as to amount? We did not start taking the lid off authorizations until we were right up against the war.

Dr. BUSH. The thing that is troubling you is this appropriation is not limited in amount?

Mr. MARTIN. That is one of the points that is bothering me.

Dr. BUSH. Personally, I see no objection to putting a limit on the authorization if you see fit to do so; but as to what that limit should be, I suggest that you ask the gentleman who is to follow me.

Mr. MARTIN. As to peacetime procedure, the matter of granting lump-sum authorizations is looked upon with some disfavor in congressional circles. It formerly was, at any rate, and I think we shall return to that practice. We started taking the lid off as we approached the war and during the war; but as a general principle, for a legislative committee to withdraw its complete further jurisdiction in the matter and leave you from there on entirely looking to the Appropriations Committee for whatever funds they wish to appropriate or recommend to the House for appropriation is not what I consider sound legislation by a policy-making committee as a peacetime matter.

Dr. BUSH. You know, sir, that I do not quarrel with you on that, because I have already stated that OSRD, which was set up under Executive order, which has been given very great freedom by the Congress, and which has needed that freedom for the purposes of this war, should go out of existence at the end of the war. The permanent structure for the conduct of research in this country, however, and the relationship of the Federal Government to research in this country, should be established by the Congress.

I have further said that is a problem of great magnitude, and you will probably take some time in which to formulate it completely, because of its complexity.

Mr. MARTIN. I am not trying to put any clamp or restriction on research in this statement of policy I am making here. I do not want to take the lid clear off and have this committee completely bypassed from now on. I do not believe in that approach to legislation. That is the principal point I should like to emphasize at this time.

The CHAIRMAN. Will the gentleman yield?

Mr. MARTIN. Yes.

The CHAIRMAN. You know, of course, that we can specify in this bill, if we want to, that \$10,000,000 is hereby authorized to be appropriated.

Mr. MARTIN. Yes; but it is not in the bill now.

The CHAIRMAN. I know; but what is this committee for if not to amend the bill?

Mr. MARTIN. I was interested in the witness' opinion of this.

The CHAIRMAN. We shall get from the next witness, I understand, his estimate of the cost.

Mr. Winstead, have you any questions?

Mr. WINSTEAD. No question.

The CHAIRMAN. Mr. Elston?

Mr. ELSTON. Doctor, I wanted to ask you how you functioned during the war. You got along pretty well with the Army and Navy?

Dr. BUSH. Very well, indeed, sir; there were the best of relationships.

Mr. ELSTON. I think it is generally the opinion that the results you accomplished were marvelous.

Dr. BUSH. Well, I think it is generally the opinion that they have been important in connection with the progress of the war.

Mr. ELSTON. The thing that disturbs me is why, if you got along so well during the war under your present set-up, it is necessary to set up an entirely new agency of government in peacetime.

Dr. BUSH. For the simple reason, sir, that most of our wartime organizations are not adapted to the peace. The emergency type of organization which is thrown together under the exigencies of war is, I submit, not fully adapted to continue permanently, and I think that in the research and development field there is no exception. We have had during the war an organization, under Executive order, which has worked very well indeed. But I do not think anyone would review that and say that it is the type of organization which should continue for the next generation as our permanent arrangement.

Mr. ELSTON. Well, both the Army and the Navy have their experimental laboratories and are experimenting all the time with new weapons, new types of planes and motors, and a thousand and one different things.

Dr. BUSH. Yes.

Mr. ELSTON. We have appropriated huge sums of money to maintain Wright Field, Langley Field, Edgewood Arsenal, and various other places which are constantly experimenting with weapons and all matters pertaining to national defense. Now, it seems to me that if we set up an entirely new agency and give it a tremendous amount of power—you are asking for an awful lot of power—we are just going to have a duplication of work; and one thing we are striving to avoid now and get away from is a duplication of work. We have too many departments in Government that are duplicating work.

So I cannot understand why, if you got along so well during the war, you have to set up an entirely new, independent agency.

Dr. BUSH. We found during the war, sir, that it has been very beneficial indeed to have the regular program of the Army and Navy in their research and development combined with an independent civilian agency that is not in the same control but continues its independent authority. That is not merely my assertion. I would be joined in that by most Army and Navy officers today, I feel sure. They feel that it has been a beneficial thing to have the civilian scientists and an independent organization supplement their research.

Mr. ELSTON. Is there any reason why the Army and Navy cannot call on you in peacetime as well as in wartime?

Dr. BUSH. That is just what this provides, sir. Both the Army and the Navy will have supplementation from the work of the Academy.

Mr. ELSTON. Why do you need a separate agency to accomplish that? Why can they not call on you by virtue of the Executive order, or otherwise, without setting up a separate, independent agency?

Dr. BUSH. This particular bill does not create any agency but simply takes care of the Academy.

The CHAIRMAN. This bill does just exactly the reverse. It authorizes the setting up of a board in the Academy of Sciences. It has been the repeated policy of the committee to get away from separate agencies. There is in the Senate a bill that does propose to set up a new board, an organization to be appointed by the President.

Mr. ELSTON. In its practical application, it sets up a new agency, because for the first time you are going to have appropriated sums of money, and they no doubt are going to be very large, and you are going to spend those sums of money without regard to the Army and Navy, because by section 2, which you say you are going to amend, you even provide that there shall not be an accounting of those funds. Certainly Congress would never agree to that, in my opinion. So you are in effect setting up an entirely new, separate, distinct agency. I do not see why it is necessary, in view of the very good job you did during the war.

Another thing: In addition to the experiments carried on by the War Department and the Navy Department, industry is experimenting all the time. They have their own research laboratories. They have some of the finest laboratories in the world. There is certainly not going to be a cessation of efforts on their part. They have made a great contribution to this war, and they are going to continue it. I have a little bit of a thought that maybe something more is anticipated than appears on the surface, when you say in your last paragraph:

Greater use of our scientific resources must be made, not only to achieve military security, but also to insure national progress.

We do not have to set up a separate agency in order to insure national progress. Private industry will take care of that. Then, you go on to say:

You will recall that President Roosevelt last November asked me to prepare a report containing my recommendations as to how science might be "used in the days of peace ahead for the improvement of the national health, the creation of new enterprises bringing new jobs, and the betterment of the national standard of living."

After all, we still have private industry. I do not think we need a separate agency of this kind in order to augment what private industry

can do. It seems to me that this is a step toward the socialization of medicine and a few other things.

Dr. BUSH. Of course, this bill has nothing to do with the broad subject on which I am to report to the President. This bill has only to do with military research.

Mr. ELSTON. There is nothing in here that says so. You provide in the bill for the appointment of civilians. You do not say how many. You may have more civilians than you have representatives of the War and Navy Departments. It may become a gigantic civilian agency for the promotion of national health and a lot of other things that will tie right in with the program of socialized medicine. There is nothing in this bill that says anything different. In fact, your report sort of indicates that somebody may be thinking along that line.

The CHAIRMAN. Have you any other questions?

Mr. ELSTON. I do not know that I am quite through.

I want to ask you another question. You are going to conduct a lot of experiments. When you obtain results, who is going to get the benefit of them? Will they belong to the Government? Suppose you invent some great weapon. Is it going to be patented?

Dr. BUSH. Would you like to have me recite the patent policy and procedure of the Office of Scientific Research and Development? I should be very glad to do so.

Mr. ELSTON. I am interested in knowing this.

Dr. BUSH. Briefly, the OSRD patent policy is intended to protect the Government interests entirely in case there are inventions made in connection with the war research programs we have conducted.

Mr. ELSTON. I am interested in knowing this: If the Government spends its money to engage in a lot of research, and something is invented that is of great value to industry and to the Government, does it belong to the Government or does it belong to the person who invented it? To whom does it belong?

Dr. BUSH. Under the contracts of the Office of Scientific Research and Development, if an invention is made in connection with one of our contracts, there is always a license to the Government for its use. In many cases there is complete ownership of the Government in the invention and in the resulting patents. In some cases the commercial rights are left with the contractor. I can go into that in detail, sir, if you care to have me do so. I believe, however, that you will find that that matter will also need to be considered when this board is set up, in exactly the same way that it was considered by my organization when it was set up, to establish proper patent clauses in contracts in order to protect us.

Mr. ELSTON. That is all.

The CHAIRMAN. Dr. Fenton?

Mr. FENTON. Dr. Bush, would a permanent set-up have any untoward effects on private research?

Dr. BUSH. I think that should be very carefully considered when we come to permanent legislation, particularly with regard to the relationship between the Federal Government and the research of science generally in this connection: That any steps that may be taken by the Congress should in no way discourage research by universities or industries, but should rather seek to stimulate private effort along that line.

Mr. FENTON. That was the object of that question, Doctor. Will it hamper them in invention, or would it act as a control on them?

Dr. BUSH. Do you mean the permanent legislation?

Mr. FENTON. Yes. Would the permanent legislation have a hampering effect on private effort?

Dr. BUSH. In the report that I am to make to President Truman shortly, we have devoted a good deal of attention to that particular matter, because certainly the actions of the Federal Government should be in the direction of stimulating and not in the direction of controlling private, independent research in this country.

Mr. FENTON. We have in our Departments of Agriculture and Interior research laboratories in which I am very much interested. I am just wondering what effect a permanent set-up such as might be developed under this bill would have. Would there be duplication? Would it take over those agencies' research laboratories that are now in existence?

Dr. BUSH. That is a matter that is not particularly closely related to this bill, but if I may devote one minute to it, it seems to me very clear that when we come to permanent legislation in regard to the relationship of the Federal Government to research generally in this country, we should also be careful that we do not injure the research now being carried on very effectively in the many Government departments. It is my personal opinion that any attempt to bring those all under a single management would be a step in the wrong direction; that they prosper best by being intimately connected with the Government departments with which they are interrelated.

Mr. FENTON. Thank you.

The CHAIRMAN. Mr. Johnson?

Mr. JOHNSON of California. You say this board is going to be concerned primarily with research, in which your scientists will develop for military purposes. How far down will you go? For instance, will you go down to the matter of foods? The Quartermaster General has prepared a tremendous food exhibit, including the dehydrating of foods and the preparation of foods for use in various climates. Will you go that far?

Dr. BUSH. You are talking about the new board after it becomes set up?

Mr. JOHNSON of California. Yes. It all has a military bearing, or it might have in war.

Dr. BUSH. We are getting that problem almost every day, Mr. Johnson, in connection with the operations of OSRD. I have before me at the present time some recommendations from our committee on medical research in regard to certain work on bovine mastitis. The problem is always one of scope. In OSRD we have taken this point of view very strongly: That we should not enter into—

Mr. JOHNSON of California. Are you going to go, for instance, into the matter of highway construction and the effect of frost, heat, wear, and tear on highways?

Dr. BUSH. We have always taken this point of view: That we should not enter into fields which are within the natural scope of other existing organizations. For instance, we have in this country

the National Advisory Committee for Aeronautics, which had done very fine work for 25 years, and without which we would not have been prepared properly in the air at the time war came on.

The Office of Scientific Research and Development has never carried on the work of aerodynamics, the problems of flight, the problems of aircraft engines, and the like, because those are the functions of the NACA. I believe everyone on this new board would take a similar point of view—that it would not feel it should enter into fields for which there are arrangements already in existence.

Mr. JOHNSON of California. One other question along the line Dr. Fenton asked you. How does your group dovetail with the research that is going on in the various universities? For instance, California Tech is carrying on a lot of research into long-range weather forecasts and certain types of routes across large bodies of water. Do you go into that kind of research?

Dr. BUSH. Of course, at the present time, California Tech is carrying on very important work under contract with the Office of Scientific Research and Development. That is entirely work devoted to the prosecution of this war. It will be completed at the end of the war.

Mr. JOHNSON of California. I mean in the future, do you want to pursue those studies further and expand the field of knowledge as this board thinks proper, and would you ask for money to do that?

Dr. BUSH. I wonder if I could say once more that it is not my board; that is a board of the National Academy of Sciences.

Mr. JOHNSON of California. You are thoroughly in accord with their objectives?

Dr. BUSH. I am thoroughly in accord with their objectives; yes. It is my understanding that this new board would examine into such matters and might readily make a contract with a university for pursuit of studies if it felt the scientific knowledge that would come from there and the knowledge in regard to the methods of application of that scientific knowledge would lead to military functions that would be important to this country.

Mr. JOHNSON of California. Would you propose, under this board and maybe the permanent one you are going to create, to develop some new laboratories under Government ownership and control?

Dr. BUSH. No, sir.

Mr. JOHNSON of California. Or are you only going to take scientific quality the way you find it now, explore it, and make sure that advances and new things are available to the military?

Dr. BUSH. This new board would most certainly not build and operate its own laboratories—Government-owned laboratories.

Mr. JOHNSON of California. You just want to expand the field of knowledge and make it available to the military for their particular purposes?

Dr. BUSH. That is right.

Mr. JOHNSON of California. Your main idea is to allow all existing agencies, private and public, to function as they are functioning now and to utilize whatever they develop?

Dr. BUSH. Yes.

Mr. JOHNSON of California. That is all, Mr. Chairman.

The CHAIRMAN. There seems to be some confusion here by some members of the committee and, I think, by the witness as well. In order to try to clarify it, I want to make this statement.

As I understand it, your proposal is to try to apply the principles of science to any proposed advancement or discovery of equipment by the Army or the Navy? Simply to find a principle for them to make it effective? That is one thing that it is proposed to do?

Dr. BUSH. Yes.

The CHAIRMAN. On the question of the amount of money to be expended, we expect to try to get the approximate amount of it, if we can, from the next witness. This committee has the power to write into this bill a provision that there is hereby authorized to be appropriated a sum not exceeding whatever amount the committee wants to fix. Then, the act can be amended, if it becomes apparent that more money is needed and the committee wants to grant it. This committee has the sole power to do that and will exercise it. I would be very greatly surprised if it did not exercise its functions by including whatever it thinks should be in the bill.

I desire particularly to have taken out of the bill the provision that eliminates the Comptroller General. The bill was written by the legislative counsel, and I questioned it at the time; I did not think Congress would approve it in that form.

On the question of separate agencies, this is not an agency at all; it is simply the setting up of a board in an existing agency, an agency that is 70 years old, or something like that. In the discussions of the Post-War Policy Committee it was definitely determined that that was one way to get away from the new agency as proposed by other legislation pending in the Congress.

Mr. JOHNSON of California. Is there any other comparable group similar to the National Academy of Sciences? Is there any other group in the country like that?

Dr. BUSH. No, sir. The National Academy of Sciences is unique in a number of ways. In the first place, it operates under congressional charter. That charter provides that it is a scientific body that is advisory to the agencies of the Government.

In the second place, it is all-inclusive in the sciences. It has as an auxiliary the National Research Council, and through that has representation in the principal scientific bodies of the country, and thus it becomes the focus of the scientific organizations of the country, for the aid of the Government by advising the Government in its processes.

Mr. JOHNSON of California. If we pass this bill and give the National Academy of Sciences an authorization for money to be extended to them, another group will not crop up and say, "You did it for them; now do it for us"?

Dr. BUSH. There is no other group that is similar.

The CHAIRMAN. This legislation the doctor seems to have confused with the matter of temporary legislation. If this is enacted as it now stands, it will be as permanent as any other legislation and would exist as the law until repealed or modified by the Congress. So it is not temporary legislation at all.

Mr. ELSTON. Who is it that is requesting this legislation? The Army, the Navy, or the Academy of Sciences? Who was it that sug-

gested to the legislative counsel that the General Accounting Office be bypassed? Somebody must have suggested it to him; he does not get ideas like that out of thin air.

The CHAIRMAN. Nobody was trying to bypass anything in this bill. At the conclusion of the hearings by the Postwar Policy Committee, I was directed to draft a bill along the lines of the testimony. I began to draft it, but I was very busy, and so I called in the legislative counsel. When they came back with the finished product, it had this provision in it. As far as I am concerned, as chairman of this committee, it ought to be stricken out. I never had any such thought.

Mr. ELSTON. I know very well that the chairman would not think of bypassing the General Accounting Office. He is like I am. He thinks we should have a very close check on Government agencies. I was wondering where the legislative counsel got the idea that appears in section 2.

The CHAIRMAN. To be frank with you, I do not know where.

Now, gentlemen, in view of the legislation pending on the floor of the House, I think we ought to adjourn until 10:30 in the morning, if that will be convenient to the members.

(At 12:27 p. m. an adjournment was taken until Wednesday, May 23, 1945, at 10:30 a. m.)

RESEARCH AND DEVELOPMENT

WEDNESDAY, MAY 23, 1945

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MILITARY AFFAIRS,
Washington, D. C.

The committee met at 10:30 a. m., Hon. Andrew J. May (chairman) presiding.

The CHAIRMAN. We will continue the hearings on H. R. 2946, a bill which we had under consideration yesterday when the committee recessed.

I think Brig. Gen. William A. Borden, in charge of New Development Division, War Department Special Staff, has a brief statement he would like to make, and we will hear him very briefly.

STATEMENT OF BRIG. GEN. WILLIAM A. BORDEN, IN CHARGE OF NEW DEVELOPMENT DIVISION, WAR DEPARTMENT SPECIAL STAFF

General BORDEN. Mr. Chairman, I have here a letter from the Secretary of War which he has addressed to you covering this bill.

The CHAIRMAN. Will you read it, please, sir?

General BORDEN (reading):

DEAR MR. MAY: The War Department favors the enactment of H. R. 2946, Seventy-ninth Congress, a bill authorizing appropriations for a permanent program of scientific research in the interest of national security, except as noted in paragraph 4 below.

This bill authorizes that sums be appropriated by Congress to finance scientific research to be conducted by the National Academy of Sciences through a Research Board for National Security. This Board is composed of both scientists and Army and Navy officers and was recently established at the request of the Secretary of War and the Secretary of the Navy.

The Research Board for National Security provides for the continuation of the kind of partnership between the military and scientists which has been so fruitful during the war. It is believed that its organization under the National Academy of Sciences will provide the flexibility, independence, and prestige necessary to attract the best scientific talent for undertaking research for national security.

Pursuant to section 2 of this bill, the funds appropriated would not be subject to review or audit by any agency of the Government. This provision is not in accord with established Government fiscal procedures which the War Department sustains. Therefore the War Department favors section 2 as drafted in Report 2 of the House Select Committee on Postwar Military Policy, which proposes legislation identical with H. R. 2946, except that the exemption from review of audit is eliminated.

It is therefore recommended that bill H. R. 2946 be passed after amendment to conform with the proposal of the House Select Committee, on Postwar Military Policy.

In view of the necessity for expediting this report, it is submitted without a determination by the Bureau of the Budget as to whether the proposed legislation conforms to the program of the President.

Sincerely yours,

HENRY L. STIMSON, *Secretary of War.*

The CHAIRMAN. General, what is your position in the War Department with respect to research and development?

General BORDEN. Mr. May, I am director of the New Developments Division, War Department Special Staff and, in that position, have all staff responsibilities for research and development in the War Department.

The CHAIRMAN. And that section has been cooperating, as I understand it, with the National Academy of Sciences and with the Navy as well, in the mobilization of the staff that you have had in use during the present war?

General BORDEN. That is correct, sir.

The CHAIRMAN. Is it your idea that this bill is necessary in order to coordinate and make permanent by statute the set-up you now have working on the problems?

General BORDEN. It is my judgment that this bill will aid in the financing of the Research Board for National Security which is already set up by mutual agreement between the Secretary of War, the Secretary of the Navy, and the National Academy of Sciences.

The CHAIRMAN. Are there any questions?

Mr. ROE. Yesterday somebody brought up the question as to the membership on this Board—that possibly the Army and Navy representatives could be outnumbered by other members appointed from other activities, and there was some question as to whether the selection of those would not exceed the Army and Navy representatives by a large majority. Would that be the cause of any concern on the part of the Army, if such a thing should result?

General BORDEN. Well, sir, the membership of the Board is that proposed by the Secretary of War and Secretary of Navy, and has been accepted by the President of the National Academy. It comprises 40 members, of which 20 are from science and industry and 20 from the Army and Navy. There is an equal division between the military and civilian members.

Mr. ROE. So it is your opinion that is of no grave concern?

General BORDEN. It is our opinion it is appropriately set up, giving equal representation.

Mr. JOHNSON. General Borden, along in 1937 and 1938, everybody, I think, who was studying it, realized there was a war coming on. In 1939 we absolutely were certain, I think, that we were going to be in the war. Now, what, if any, research and scientific investigation did the Army make to get ready for the war?

General BORDEN. Mr. Johnson, that is a long story. In other words, it would be difficult to give you a complete answer.

Mr. JOHNSON. I do not mean for you to give the complete story; but did they do anything in a scientific way to perfect airplanes, to perfect munitions, and to take care of all those scientific problems which you have found necessary, to bring your dilapidated organization up to a modern army to fight a modern war?

General BORDEN. Of course, research and development has been under way ever since the last war, and before then. The degree to which it has been carried forward has been dependent upon funds which have been appropriated by the Congress.

Mr. JOHNSON. I was coming to that. Were you hampered, in doing what you thought was necessary to get the country properly prepared, by the lack of funds?

General BORDEN. To my knowledge, the funds which were requested from Congress were always appropriated for this important activity.

Mr. JOHNSON. In other words, you think you had a good scientific set-up before the war to bring us up to where we ought to be to take care of ourselves?

General BORDEN. Well, that is a matter of some question, Mr. Johnson. As I say, the Congress appropriated the funds that were requested. Whether the funds which were requested were sufficient is open to some question.

Mr. JOHNSON. Well, I do not think you were doing what you ought to do, and maybe you did not ask for it; I do not know; but I wanted to help you out a little bit here to show we were thoroughly unprepared in a scientific way to get us ready when the war came on; and, with this whole thing staring us in the face, when 1941 came we were not prepared to meet it, were we?

General BORDEN. We were prepared as well as we could be with the available appropriations.

Mr. JOHNSON. I know; but had we taken the necessary scientific steps—that is what I am talking about particularly—to bring all of our different activities in the War Department and Navy Department up to where they ought to be?

General BORDEN. Well, that is a question of degree, Mr. Johnson, and perhaps hindsight suggests that a greater effort should have been made.

Mr. JOHNSON. I am trying to make a record here to help you with this legislation, and here is your chance. Cannot you tell us something that we can pin our judgment on?

General BORDEN. We feel this legislation is desirable to enable us to carry forward research and development in the scientific field.

Mr. JOHNSON. But there is no war impending now that you know of, is there, regarding any particular enemy now?

General BORDEN. We are in a war now, sir.

Mr. JOHNSON. I mean after this war is over. We are all keyed up now, probably, but I would like to bring out for the record, if I can, that even with a war facing us—and the higher-ups in the War Department certainly knew it was coming just as sure as they know tomorrow is going to come—they did not have the equipment or organization to do the scientific work they should have done.

Mr. KILDAY. If my colleague will yield—of course, you were not here in those days right before the war—but I remember very clearly that we had a fight to get an authorization of 5,500 airplanes in 1939.

I am very much afraid you are going to get in trouble with some of your Republican colleagues on the question of the prewar policy.

Mr. JOHNSON. Well, if I had been here, I would have helped you.

Mr. KILDAY. I also remember in February of 1939 we were at Langley Field, and we looked at all of the B-17's that were constructed, and I think there were six there.

Mr. JOHNSON. I appreciate that, but what I would like to get from the witness, if I could, is some of the obstacles that confronted them in getting their scientific machine into shape to conduct this war.

The CHAIRMAN. I may say that somewhere in the Congressional Record there is a table furnished to me by the Secretary of War some 4 or 5 years ago which showed that following the First World War the average appropriations for new material, and I think research and development, was \$23,000,000 a year for all purposes. For 14 years following the last world war, that was the situation. I do not know whether they asked for more or not, but the appropriation for scientific research was practically nothing.

Mr. JOHNSON. Coming back to my original inquiry, can you give us a little concrete information about that?

General BORDEN. You mean as to the status?

Mr. JOHNSON. Yes; to lay the basis for the need for this thing.

General BORDEN. We have learned a great deal, naturally, as a result of this war, and particularly about the work the scientists have done. Our purpose here is to benefit from the experience we have had, and to carry forward arrangements which will assure continued participation by the scientists with the War and Navy Departments in research and development.

Mr. JOHNSON. Several years ago we were invited by the Ordnance Department to review an exhibit of various types of ordnance and to get a report from General Campbell and his staff, and he had there, as I recollect it, one general who was in charge of the Research and Development Section. Is that being carried on in peacetimes, or was that created just during the war?

General BORDEN. Oh, no, sir. Research and development of that character was and will be carried on in peacetime. As a matter of fact, I know of no contemplated change in the organization.

Mr. JOHNSON. In peacetime, when we carry this on, do you rely largely on civilian scientists, or do you have some of your own?

General BORDEN. Our peacetime activities employ all of the best available potential sources which will enable us to proceed, including scientists, industrial laboratories, and our own.

Mr. JOHNSON. In other words, you take your facts and problem over to a group of scientists and see if they can help you with it; is that the idea?

General BORDEN. That is correct.

Mr. JOHNSON. Like the problem of whether your needs will result in a flight over the ocean—you take those problems over to the university professors and scientists of various types?

General BORDEN. We use all of the facilities not only of the universities, but of industry—any organization that can give us the best assistance.

Mr. JOHNSON. Take these wonderful bomb sights developed during this war. Were they developed by civilian scientists or by practical fliers and engineers?

General BORDEN. They were developed by engineers, including scientists—technicians.

Mr. JOHNSON. When you say "engineers," do you mean engineers in the Air Forces?

General BORDEN. No, sir; engineers in industrial laboratories.

Mr. JOHNSON. You told them your problem, and they worked it out for you?

General BORDEN. That is correct.

Mr. JOHNSON. And they have been highly successful?

General BORDEN. They have. It is a joint effort. In other words, we call it in the Ordnance Department, for instance, an industrial ordnance team. It is teamwork between the commercial world, the scientific world, and the War Department which has been in being before this war. The extent to which we are able to carry that forward depends upon the funds and the organization we are permitted to have.

Mr. JOHNSON. Well, is it your considered opinion that this lay-out will give you a much better chance to keep abreast of the scientific development that the Army and Navy should be abreast of than if it retained the old form, so that, when you go up to Congress and ask for appropriations, you can specify what is wanted for your scientific research?

General BORDEN. I think this will assist greatly. It is not the only thing to be done, and to enable scientists to engage in this effort with us as a partner, in my judgment, will assist greatly. It is not the only thing which must be done, but one of the things.

Mr. JOHNSON. How is it any better than your former relations that you say you had?

General BORDEN. Because it provides a good arrangement whereby we can work together. I described it as a partnership. As far as I know, this is the first partnership that has been drawn up, which has been by agreement between the Secretary of War, the Secretary of the Navy, and the scientists.

Mr. JOHNSON. And before that, it was only just that you contacted them spasmodically, you might say?

General BORDEN. Well, this makes it easier, Mr. JOHNSON. It has been going on in detail with reference to one problem at a time, but this brings a body together which will view the problems presently before them, and we will get the assistance of the scientists. It is a partnership mechanism.

Mr. CLASON. General Borden, it seems like old times to see you once again. I think I would like to digress long enough to state that General Borden, while commanding officer at the Springfield Armory, did more, I believe, to put the Springfield Armory on the production basis which it has had during the present war than any other one individual. He certainly cooperated with me on innumerable occasions; and, as a result, the Army certainly has had more new buildings and new machinery, which has meant much to the War Department.

The CHAIRMAN. Then the general has been engaged in politics.

Mr. CLASON. He has not been engaging in politics, but he has certainly been a very efficient Army officer.

Mr. JOHNSON. Did the Congressman cooperate with the general?

Mr. CLASON. I cooperated with him—you bet.

Now, at the present time, as I understand it, since June 1941 there has been an Office of Scientific Research and Development, and this

particular bill, in section 1, is an attempt to carry out, in part at least, the work that has been done by this Office of Scientific Research and Development?

General BORDEN. Yes, sir.

Mr. CLASON. Do you know, from your own knowledge, if there is to be any change with reference to the work insofar as it relates to the Army and Navy, from what is now being carried on by this Office?

General BORDEN. It is difficult to indicate exactly all of the types of research which this organization will take over, because, for instance, times will change; but the Office of Scientific Research and Development has been very prominent in the fundamental field, and it is primarily in the fundamental field that we expect this Research Board to conduct its experimentation.

Mr. CLASON. Dr. Bush testified yesterday that between June 1, 1941, and March 31 of this year, 441 institutions have received approximately \$500,000,000, or at least had received the benefit of contracts which involved possibly \$500,000,000; that is, in less than 4 years, 441 institutions would have received this sum which amounts to more than \$1,000,000 to each institution. Do you know what those institutions are? Were they all colleges and universities, or something else?

General BORDEN. Of course, you could get that more definitely from Dr. Bush; but they included primarily scientific organizations, universities, technical laboratories, industrial laboratories. They were not confined to universities, but went into the industrial field as well.

Mr. CLASON. One thing which has troubled me with reference to this bill is the fact if this bill became law that no policy-making committee of the House, either the Naval Affairs Committee or the Military Affairs Committee would thereafter have any say whatsoever with relation to what the policy of either the War Department, the Navy Department, or this organization will be as set up under H. R. 2946, and it does seem to me, in view of the statements I have heard so often on the floor of the House, that the Appropriations Committee should not be given any further power with reference to legislation and authorizations which have to do with policy—it seems to me that this bill has gone rough-shod over both the Naval Affairs Committee and the Military Affairs Committee, and I was wondering what the position of the War Department was with reference to bypassing both the Naval Affairs Committee and the Military Affairs Committee.

General BORDEN. Mr. Clason, this relates to an agreement which has been reached between the Secretary of War, the Secretary of the Navy, and the National Academy of Sciences, and that agreement does not remove from the Secretary of War and the Secretary of Navy their responsibility for the conduct of research and development for which they are responsible in connection with the War and Navy Departments. It effects a partnership arrangement between the three agencies which are to carry out such research and development as is considered essential for national security. I do not believe it affects policy and, as far as I can see, the Congress will be as much involved in the determination of policy as it heretofore has been.

Mr. CLASON. Except for the fact this is so worded that once this bill becomes law, the only committee of Congress this group would

have to face during the life of this organization would be the Appropriations Committee, and neither the Naval Affairs Committee nor the Military Affairs Committee would have anything to say about what this organization did.

General BORDEN. You have in the bill that a report will be rendered to the committee, and it would seem to me that the responsibility of this organization to the committee is quite direct.

Mr. CLASON. A report after the thing has happened is a whole lot different from securing advance permission or authority from the committee to do that which is later set forth in the report.

General BORDEN. It would be in the same position as the War and Navy Departments going to the Congress for their appropriations. If there was anything in its projects which it presented which was not in accord with the desires of Congress, those would naturally be eliminated. Furthermore, if their report of performance did not agree with their estimate, it would seem to me this would enable Congress to take any appropriate action. If things tend to get out of line, the Secretary of War and the Secretary of the Navy, who are represented on the Board, would have a great deal to say to maintain the activities of the Board in accordance with law and regulation.

Mr. CLASON. How much money annually would you expect this organization to request?

General BORDEN. That is a very fair question. The present organization, of course, is to be started while O. S. R. D. is in operation. I am talking about the Office of Scientific Research and Development which is an emergency organization. It is not desired that the Research Board operate to the extent of duplicating or taking away anything from the activities of O. S. R. D., or its responsibility; therefore, during the war, that is, as long as the Office of Scientific Research and Development is in operation, the projects handled by this Board will be those of a long-range character which would not be undertaken by O. S. R. D., and the need for which could be defended even in the emergency. As I understand it, Dr. Bush has an agreement with the Congress that he will only undertake such research and development as has immediate application to the present war. For that reason, our estimates have included a very small amount for this year. By that I mean our estimates contemplate starting and operating this Board on a contractual basis between the War and Navy Departments, to begin with, and then further action depends upon this legislation and the appropriations that might follow. Our estimates for this year from the War Department include a rather small amount, totaling \$165,000 from the Army and, for next year, for the Army, \$8,800,000.

Mr. CLASON. \$165,000 for this year?

General BORDEN. \$165,000 for this year out of funds the Congress has already appropriated, to be included in contracts with the National Academy to carry out the projects to be handled by the Board and, for 1946, \$8,800,000 to cover projects we expect to be undertaken then. This is, of course, subject to further action by the Bureau of the Budget.

Mr. CLASON. Would the Navy also be contributing?

General BORDEN. Yes, sir.

Mr. CLASON. Equally?

General BORDEN. No, sir; because the degree of participation depends largely upon the interest or, rather, upon the related responsibility, and upon that basis for this year the estimates include only \$65,000 for the Navy. The participation for next year depends upon the estimates of the Navy, and I am not qualified to tell you what they are. I think they are in the neighborhood of somewhere around \$4,000,000.

Mr. CLASON. Would there be contributions from any other sources than the Army and Navy?

General BORDEN. No, sir.

Mr. CLASON. I noticed last night's paper carried an article saying that President Truman had slashed or cut back the Office of Scientific Research and Development to \$18,000,000. Do you happen to know the reason for that cut-back?

General BORDEN. No, sir; I do not. That would have to be obtained from OSRD which prepares its own estimates and submits them, as the Army and Navy do.

Remember, Mr. Clason, these estimates are subject to further review and I am just giving you the figures as they were presented to our budget people, and I am not in a position to tell you what the final figures would be.

The CHAIRMAN. I may say to Mr. Clason I think there is a general program for economizing in many directions.

Mr. CLASON. You mean the cut-back to \$18,000,000?

The CHAIRMAN. Yes; and other things.

Mr. ELSTON. When is that program going to start?

The CHAIRMAN. It has already started.

Mr. ELSTON. Good.

Mr. CLASON. Now, supposing you have this money, for what is the money expended? What do we get for the money? Do we get just services, or do we get material, or something tangible or wholly intangible?

General BORDEN. The tangible results of this will be reports, and results of laboratory experimentation. It is extremely difficult to tell you in a concise form that you will get a piece of apparatus, or get a piece of experimental equipment; because fundamental research does not necessarily end up in such a specific device and many times, as a matter of fact, you may get a negative result in an experiment which is undertaken. But the results will be comparable to any other type of fundamental research which is undertaken, and will normally result in a report which will be the tangible evidence of the expenditure of funds.

Mr. CLASON. But, for the \$500,000,000 which have been expended in the last 3 years, did that money go wholly in salaries, or how much went for salaries, how much went for materials, and how much for other things?

General BORDEN. You are speaking of OSRD expenditures?

Mr. CLASON. Yes.

General BORDEN. OSRD in many instances has gone beyond fundamental research and has actually produced specific things that have been developed. As to the break-down of that, I am not in a position to tell you. You have to get that from OSRD. But, normally speaking, expenditures for fundamental research go into laboratory

equipment and the salaries of the technicians who are engaging in the work.

Mr. CLASON. What I am trying to find out is what part, if any, is going out to universities and various educational institutions so that in effect the United States Government will be paying part of the expense of those institutions?

General BORDEN. If the National Academy of Sciences places a contract with the New York University, let us say, the New York University will perform work just as any other contractor would perform work for the Government, and the salaries and other expenses involved in the conduct of the experimentation would be a direct charge to the contract.

The Board would select only those universities or other facilities that could perform this work to the best advantage and, in doing that, they would perform it on a contractual basis just as any other work of this character is done for the Government by such an institution. We have countless numbers of such contracts now under way, in which the institutions and universities are working on contracts of this type.

Mr. CLASON. All those contracts are not with universities, are they? Do you do any business with du Pont or United States Steel?

General BORDEN. Oh, yes; du Pont, Bell Laboratories—

Mr. CLASON. And they will come in for some of this money?

General BORDEN. The best people that can do the work will be selected.

Mr. ELSTON. You spoke of bringing about a close partnership arrangement through this affair. Has there ever been an instance in which industry or the universities and educational institutions of the country generally have not cooperated with the Army and Navy?

General BORDEN. Not to my knowledge. But here is the point that must be appreciated: Whereas the answer to your question is that there has been the highest degree of cooperation, this provides an easy means of accomplishing the result and somewhat better than we have otherwise been able to accomplish it.

Mr. ELSTON. Have you experienced any difficulty in the war in getting cooperation from industry or educational institutions?

General BORDEN. No, sir. The question is not one of cooperation—the difficulty of obtaining cooperation. It is the ease of getting the scientific minds and ourselves working on a mutual problem, and this provides a body which enables scientists, and the Army and Navy, to think together on a group of research problems which will be of value to our national security.

Mr. ELSTON. Well, there probably never was a time in our history when more research problems were presented than during the past few years.

General BORDEN. Yes, sir.

Mr. ELSTON. And you have been able to get along together and have been able to solve those problems, and certainly in a very magnificent style.

General BORDEN. Yes, sir; and we have done that because we have also had the assistance of the Office of Scientific Research and Development. And that office, which is an emergency office and goes out of existence within 6 months after the termination of the emer-

gency, has provided us with a great deal of this which we visualize must be carried forward after the war, and the Research Board will enable that partnership to be continued.

Mr. ELSTON. So that the purpose of this organization is to continue OSRD?

General BORDEN. We do not propose a continuation of OSRD. It is an arrangement which will be a substitute for OSRD in time of peace.

Mr. ELSTON. What will it do that OSRD did not do during the war?

General BORDEN. While it will probably do very little more than OSRD has done in the war, still it will provide a means for continuing this activity during peace.

This provides for a partnership arrangement without the creation of an independent agency to carry forward that work. Whether an independent agency should be established will depend upon the future organization of the Government. We cannot determine that now. We do not know what the organization of the Government departments will be which will carry on national security. Until that has crystallized, we think this proposed organization should be undertaken as an interim arrangement, pending determination of possibly a better scheme.

Thus, this Research Board for National Security is visualized as a means for maintaining the relationship with science which has been carried forward by OSRD, pending the determination that something else may be more effective. Does that explain it satisfactorily to you?

Mr. ELSTON. That is an explanation, but the thing I am concerned about is this: OSRD was set up just like countless other agencies were set up, with the understanding that they were to terminate 6 months after the war, or sooner. There are efforts on foot with respect to some of those temporary agencies, to make them permanent.

This is just another instance where they want to maintain a war-time agency as a permanent agency of the Government.

I cannot understand why the Army and the Navy cannot go right on functioning and continue to cooperate with industry and educational institutions without setting up this kind of an independent agency.

While you say it is not exactly an independent agency, in effect it is, because they can come to Congress and get appropriations for salaries for a big administrative set-up, and they will eventually, if not now, function as a separate and independent agency of the Government.

We are trying to get away from those agencies, and yet this is another such opportunity to build up an additional agency that might eventually cost a lot of money.

General BORDEN. Well, sir, we do not look upon it as the setting up of an independent agency, and for the time being the War Department feels that this should be undertaken as an interim measure rather than setting up an independent agency.

This is an arrangement which has been effected by an agreement between the Secretary of War, the Secretary of the Navy, and the National Academy.

The purpose of this legislation is to make it administratively easier to provide funds for the research which this board is to supervise and direct.

We are in the process of making the necessary arrangements for starting this on a contractual basis, and that means if the money is appropriated to the War and Navy Departments, then by contract the work will be assigned to the National Academy.

It has been determined that the only way this can be done under existing law is by a contract by the War Department and a contract by the Navy Department with the National Academy, and in each case drawing the necessary funds from individual appropriation items.

The CHAIRMAN. You are wrong about that, General. The bill proposes to make an appropriation direct to the National Academy of Sciences, which is exactly opposite to what has been done heretofore by allocations by the Army and the Navy to the Academy.

General BORDEN. That is correct, and I was attempting to show where the procedure under existing law was causing us confusion, and we felt that your bill would make it simpler.

The CHAIRMAN. We are discussing the present situation.

General BORDEN. Yes, sir; I am discussing the present situation.

We have been in the process of working out this contractual relationship, but it is somewhat cumbersome. It is very difficult to define fundamental research in a contract, and the effect will result in the appropriation of funds to the War Department and then the transfer of those funds to the National Academy by means of a contract.

In discussing this matter before Judge Woodrum's Committee on Postwar Military Policies, it developed that the simplest procedure would be one in which funds would be made available direct to the Board by appropriations, and the findings of that committee seem to me to be sound. It will eliminate the more complicated procedure of routing it through the War Department and the Navy Department by placing it on a direct appropriation basis.

Mr. ELSTON. The Board could not possibly know how much money it would need until the Army and the Navy had determined what its work would be.

General BORDEN. There again we think we will derive considerable benefit. It is contemplated that the Research Board will review the fundamental research envisaged for national security, and will submit estimates, the determinations of which are participated in by the War and Navy Department members, who comprise one-half of the Board. For that reason it would be a joint working arrangement in which the Army and the Navy and the scientists would prepare an estimate and submit it to the Congress.

Mr. ELSTON. Have you any idea what personnel the Board has today?

General BORDEN. Yes, sir. The Board has been organized, has been in session, and the membership of the Board—

The CHAIRMAN. You gave that already.

General BORDEN. Yes.

Mr. ELSTON. What I am particularly interested in is concerning salaries and administrative expenses.

General BORDEN. The members of the Board serve without compensation.

Mr. ELSTON. How much of an administrative set-up would they have?

General BORDEN. The administrative set-up would be extremely small, and necessarily so, because the work of the Board will be con-

ducted by contract with other scientists, laboratories, and institutions.

In other words, the Board provides the scientific background which enables the selection of the institutions to be made where the contracts will be carried out. They will evaluate the project and break down the project into its scientific groupings, and then the actual work will be undertaken by contract by the National Academy with the people who will undertake the work.

Mr. ELSTON. How big a field will this Board go into? Will they go into a field of munitions, ordnance, and the like, and will they go into the field of public health, and things of that kind?

General BORDEN. The Board will undertake fundamental research in any field involved in national security, and that covers the field of ordnance, the Signal Corps, Air Force research that is not undertaken by the National Advisory Committee for Aeronautics, and, of course, medical-research problems which relate to national security, and others.

Mr. ELSTON. Would it take in public health? Surely that tends toward national security. Will they take in practically everything that tends to national security? If the health of a nation is good our national security would be sounder.

I am wondering how far they intend to go.

General BORDEN. The purpose of the Board is to only undertake such research as is primarily determined by the Board to relate to the activities of the Army and the Navy.

The CHAIRMAN. Is not the real necessity for this arrangement through the National Academy of Sciences, the fact that in peacetime years, following the war, because of the military aspect of these developments, this work should be kept in the War Department and the Navy Department and the Academy as a means of protecting that work for the Government?

General BORDEN. We think that is definitely so; yes, sir.

The CHAIRMAN. We thank you for your statement, General.

We also have with us this morning Mr. Frank B. Jewett, the President of the National Academy of Sciences.

I want to ask Mr. Jewett to give us, as definitely as he can, the amount of money they will need to carry on this work.

We will be glad to have a statement from you at this time, Mr. Jewett.

STATEMENT OF FRANK B. JEWETT, PRESIDENT, NATIONAL ACADEMY OF SCIENCES

Mr. JEWETT. Mr. Chairman, my name is Frank B. Jewett. I am President of the National Academy of Sciences and a member of the National Defense Research Committee, and since its expansion, as President of the National Academy of Sciences I am, ex officio, a member of the council of the Office of Scientific Research and Development.

So that you may have a proper background against which to relate anything I may say, I would say that for 40 years I have been concerned with the research and development work of the American Telephone & Telegraph Co., and for 30 of those 40 I have been a vice president of the American Telephone & Telegraph Co., or director

of its entire research and development work. My experience has been that of an industrial research director, and I was in that position until I retired from active service last fall.

I will try to confine myself as specifically as possible to this bill and to the questions I have heard asked of Dr. Bush and General Borden. I think I can throw a bit of light on some of the questions that were asked by Mr. Johnson and others.

As a basis for that, and for any questions that you may ask, and in the light of some questions asked yesterday and this morning, it seems to me that part of the difficulty which confronts some of those who asked the questions is lack of a full understanding of just what this agency which the War Department and the Navy Department have asked to assist in this operation is.

So I have prepared this very brief statement which it seemed to me might be well to have and to bear in mind as a background for any questions you may desire to ask. Following that I will try to answer very specifically some questions asked, in order to avoid the necessity of repeating them. Later it may be that I can throw some further light on the matter, to whatever extent you want to go, based on my experience with scientific research and development in two wars and the intervening period of peace.

In order fully to understand what is contemplated in the Research Board for National Security which the National Academy of Sciences has established at the request of the Secretaries of War and Navy; the field of activity in which it is designated to work; the limitations placed on its operations in the letter of request and the methods to be employed in those operations, it is essential to keep clearly in mind certain things about the Academy.

It is also desirable to keep clearly in mind the experiences of the present war and the considerations of those experiences which led the Secretaries to request the formation of the RBNS as a mechanism for preserving in the postwar years such measure of those experiences as will be helpful to the military in enhancing national security.

THE NATIONAL ACADEMY OF SCIENCES

The National Academy of Sciences is not an agency of Government in the sense that it is part of the executive department.

It is a private corporation created by the Congress in the furtherance of a far-sighted State policy. It was created by an act of incorporation approved March 3, 1863.

The end which Congress sought to attain in the act of incorporation was to insure to Government at all times and whenever desired the best completely unbiased advice which the Nation possessed in matters of science and technology. "Art" was the word generally used prior to the Civil War.

The record shows that discussion of this need was initiated in colonial times and that over a period of 70 years or more various schemes were considered by prominent men for implementing our Government with something analogous to the Royal Society in England.

The method finally adopted by Congress was the creation of a corporation which was to be completely free to manage its own affairs entirely divorced from any influence of government or any other body,

private or public, but which was obligated to serve government, "whenever requested" and to do this without compensation. The limiting words "whenever requested" preclude the Academy from initiating matters in government and from enforcing its advice or findings.

Congress in the wording of the act imposed on the Academy and its members the highest of all human obligations, namely, the obligation to serve the State to the best of the uninfluenced ability of the members and to do this without expectation of compensation. This obligation has been scrupulously observed for over 83 years. It has also determined the character and qualifications of the men and women elected to be members of the Academy.

The crux of the act is in the words in section 3, which read :

and the Academy shall whenever requested by and department of the Government, investigate, examine, experiment, and report upon any subject of science or art, the actual expenses of such investigations, examinations, experiments, and reports to be paid from appropriations which may be made for the purpose, but the Academy shall receive no compensation whatever for any services to the Government of the United States.

This provision of the act is basic to and controlling in everything which the Academy does at the request of the Government. It is incorporated in the contracts which the Academy enters into with departments of government involving the use of Government funds for reimbursement of actual expenses incurred and all other provisions of the contracts are subordinate to it.

All vouchers for reimbursement are on certification of actual expenses incurred, without compensation, and all accounts are available for audit by the representatives of the asking department or of the General Accounting Office.

THE NATIONAL RESEARCH COUNCIL

The National Research Council mentioned by Dr. Bush yesterday is a permanent committee or agency of the Academy which, as he explained, is designed to tie together all the national scientific and technical societies of the United States to the end that the Academy can at all times fully discharge its obligations of service to the Government.

It is this combination, in the corporation created by Congress, of an Academy composed from among the most distinguished men in every sector of physical science and a council which brings to their aid all the organized power of the national scientific and technical societies of the Nation, which makes the Academy unique and the most powerful agency in the world for the mobilization of science in aid of government whenever that aid is needed or requested.

The Research Council was established as a permanent part of the machinery of the Academy in response to a request of President Wilson contained in Executive Order No. 2859, issued May 11, 1918. As the preamble to the order states, the request was made in order to perpetuate the temporary National Research Council established in 1916 as a war measure. This earlier National Research Council was in effect the Office of Scientific Research and Development of World War I.

GENESIS OF RESEARCH BOARD FOR NATIONAL SECURITY

Dr. Bush has testified that the OSRD is purely a temporary war agency and will cease to exist when the war emergency is over. This is true not only because it derives from the war power acts which will terminate but more it is true because it is in fact something which simply cannot exist and function efficiently in peacetime. It has been a marvelous tool in aid of a nation at war and has done great things in aid of the military. It has been able to do this because for the time being, the best scientific and technical men of the Nation have been willing to abandon their normal ways of life and devote themselves unstintedly to war work to the exclusion of all else. Practically every condition under which they have worked is repugnant to the normal procedures of science and technology. Almost without exception, every man in the great organization is anxious to return to his creative peacetime work.

Any attempt in the postwar years to perpetuate OSRD would fail because it could not retain the top scientists and technologists who have made its accomplishments possible. An organization might be maintained in form, but it would be a futile thing since it would consist essentially of men of mediocre ability.

When, almost exactly a year ago, it began to be clear that the war would terminate successfully and that OSRD would begin to liquidate and finally to terminate, the Secretaries of War and Navy, and we of OSRD became concerned with the problems of future security, of how best to salvage in the postwar years such of the long-range pioneering research as was likely to lead to radically new and unthought of instrumentalities of warfare as were essential to an adequate national defense; likewise, to maintain in some measure the close association between top civil science and top military thinking, which had proved so fruitful during the war.

The result of these first considerations was the appointment by the Secretaries of War and Navy of the Committee on Postwar Research, to which Dr. Bush referred yesterday. It consisted of eight high-ranking Army and Navy officers and four civilian scientists with a civilian chairman, Mr. Charles E. Wilson. I was one of the four civilian members.

The Committee labored through the summer of 1944.

From the beginning the Committee was unanimous on certain cardinal points, among which were—

(1) That it would be extremely difficult to maintain the interest of top civil science in peacetime and that about all that could be hoped for would be to enlist a portion of its thought and effort, and that mainly by an appeal to men's patriotism.

(2) That any agency chosen should confine itself strictly to those fields of research which gave promise of essentially new implements, instrumentalities, or methods of warfare. That the agency should not in any degree become a competitor of the regular research and development of departments of the military nor concern itself with the development or improvement of military tools.

(3) That whenever any research showed that a new military device or method seemed clearly possible, further work should be turned over

to the military as the only agency fully capable of evaluating all the possibilities, limitations, and uses of the new thing.

These and other considerations were obvious, both because of the inherent limitations of any peacetime civilian research organization dealing with so complex a matter as military matériel and methods, likewise because it was recognized that any set-up which savored of competition would inevitably result in a destruction of that close cooperation which the interests of the national defense demanded. The Committee recognized also that time was of the essence of the job, if a break with the work of OSRD and a loss of long-range value was not to result.

As Dr. Bush testified, OSRD is a temporary organization concerned solely with the problems of this war. This is not only because of the Executive order which created it, but also because in each annual presentation to Congress of the program and financial requirements for the next fiscal year, the Appropriations Committee has been specifically assured that so far as humanly possible all money would be spent in ways and on things likely to further victory in the present and not some distant future war.

OSRD has been meticulous in observing these restrictions in its operations. As the end of the war has approached it has increasingly and in accelerated fashion diminished its existing long-range undertakings and has refused to undertake long-range research problems of undoubtedly value to the military in the future. At the present time the decrease in OSRD activities is going on apace and long-range problems will shortly be essentially nonexistent.

When the Committee made its report to the Secretaries it was unanimous on two points, namely, (1) on the make-up of an initial RBNS under any auspices and, (2) on the desirability of asking the Academy under its congressional charter immediately to set up a RBNS to function until the whole question of postwar military organization could be finally determined by Congress.

It was almost evenly divided on the question of whether a permanent RBNS should best be under the Academy, where its structure and operations could be modified easily or abandoned as circumstances and experience dictated, or (2) under a new independent agency which Congress would be asked to set up.

Those of us who were opposed to the idea of asking Congress immediately to create a new independent agency before it had completed its study of the whole postwar military set-up, of which civilian research was but a small part, did so for several reasons.

(a) Until we had some considerable peacetime experience with civilian research we were completely in the dark, both as to what could or could not be accomplished. Nor were we at all certain of the type and composition of the Board best adapted to supervise the work.

(b) Until Congress had determined the final pattern, the hasty creation of an independent agency by law would simply increase the difficulty of solution. We felt that Congress itself, as well as the military, would profit by actual experience of a flexible organization in an existing agency which had no vested interests and which could be modified or stopped at any time without necessity of the congressional action required to abolish an established agency.

In other words, we were averse to assuming clairvoyance as to an unknown future and of asking Congress to act on the assumption of that clairvoyance.

LETTER OF REQUEST FROM SECRETARIES OF WAR AND NAVY

On November 9, 1944, the Secretaries of War and Navy addressed a letter to me as President of the Academy (copy attached) asking the Academy " * * * to establish promptly within the Academy a Research Board for National Security" to operate until Congress made that determination.

This letter was specific in its prohibition on two points, namely (a) :

(5) The Board shall, in no way, relieve the Army and Navy or other governmental agencies of their responsibility for, or authority over, research and development work conducted under their legal cognizance.

and (b)

(7) The Board shall make use of existing laboratories and facilities, where practicable. The Board shall not operate laboratories under its own auspices.

Paragraph 11 of the letter provides for funds for the Board in separate items in the War and Navy Department appropriation bills. It is this paragraph that H. R. 2946, if approved, would amend by having Congress make direct appropriations to the Academy of the funds needed for the actual expenses of the Board as it deems proper to allocate to this type of work in any fiscal year. If it fails to make any appropriation the Board would automatically cease to exist without further action by Congress.

That, we consider, is the fundamental basis of the organization which this bill seeks to implement with funds.

I have read the bill, and I have read the amended form of the bill as suggested by the select committee, which consists of the elimination of the nonaudit provision, of section 2. I think that the elimination of that provision is highly desirable, not only from the standpoint of the Government, but from the standpoint of the Academy as well.

I suspect that the inclusion of the nonaudit item in the original draft of the bill was occasioned by some of the discussion as to the nature of the work which this Research Board for National Security would do if it were to accomplish the object for which it was set up.

If the Board is successful, and nobody can predict in advance whether it will or will not be successful, or to what extent it will be successful—in developing early out of growing science the elements of entirely new tools of a military character, it is of the utmost necessity to the safety of the Nation that they be kept as secret as possible. Any inkling of a new thing which will come out of that work and which becomes of general knowledge, defeats the very object of the work.

The result is that as in the case of OSRD and of all work of a secret character for the military, the work must of necessity be performed by men who have been cleared and are under obligations of secrecy. It would be fatal if, through any scheme of audit or what-not, the secrecy of safeguards were broken. If the audit is merely an ordinary money audit, there is no reason for any worry.

It may well be however, in connection with any audit, since nobody can tell in advance who will make that audit—that it will be necessary

to have the representatives of the General Accounting Office cleared by the F. B. I. and the Army and Navy Intelligence Services and put in exactly the same status as the members of the Board or their employees.

It seems to me an audit of the accounts is clearly indicated.

I might say, in connection with the Board itself, as General Borden has testified, and as the letter of the Secretaries indicates, the Board, as presently constituted, is evenly divided between distinguished scientists and industrialists and top-ranking policy-making members of the Army and the Navy. It would appear to me that a board so constituted would serve the purpose which is indicated and at the same time adequately protect not only the Government's interest, but insure that any work undertaken or any funds solicited of Congress would be in harmony with the general plans for national security in the Army and the Navy. Such a Board will ensure that full consideration of future tasks for military requirements has been given both the point of view of civilian scientists and the point of view of the policy-making groups in the Army and the Navy.

The question was raised as to the probable amount of money which would be required, and I heard General Borden's testimony about that this morning. You will realize that if the Board carries out the intention of the Wilson committee and the intentions of the Secretaries, it will be concerned wholly and exclusively with the OSRD type of work. That is it will be concerned with the new things of science.

The ideas back of this are threefold. One is to continue, in peacetime, when men of science are going to be concerned primarily, not with military things, but with other things, to maintain as far as possible a continued amount of interest in national security matters.

Second, to maintain the close cooperation, which has proved so very fruitful between top science (and I am not talking about the vast amount of underlying secondary talent) and top military thinking. That will be a very difficult problem in peacetime.

And, third, to seek to shorten the period between the emergence of an idea which is the embryo of an entirely new military tool and the time when the military can pick the idea up and develop it into a victory weapon.

The whole past history of mechanized warfare, without a single exception so far as I know, shows that the course that things have taken is about as follows: An idea emerges from the work of fundamental scientists, which has in it the elements of a military method, weapon, or tool. Likewise the elements of a civil development generally, if not always, the civil use of the idea develops first. It is only after the civilian possibilities have been pretty clearly proven that the military values begin to appear, and the military then adapts the civilian usage to the particular requirements of warfare.

It is hoped that with this new type of arrangement—whether Congress ultimately determines that this RBNS set-up is a good permanent one, or whether they want to handle it in some other way—we can maintain over the years a close cooperation of the top groups and can shorten the period between the emergence of a new idea in science and its realization by the military and its adaptation by them.

If we can do that and maintain in this country of ours a degree of secrecy with regard to these things, then and to that extent we will have increased the security of the country.

The question was raised as to the amount of money required, and General Borden gave you an estimate of what the Army had proposed, and their view of what this Research Board of National Security might undertake. He said, and I think correctly, that this was the added up value or cost of the projects which the Army and Navy had submitted, on the assumption that they were going to be accepted by RBNS.

It is not a boiled-down thing yet, because the Research Board for National Security and their executive committee are still scrutinizing them to see whether they are proper things to be taken over by the Board under its directive.

I have examined these proposals and while I cannot speak for the final judgment of 40 men, I think that if the Board confines itself to the fundamentals set forth, as they have been stated, namely, basic science research and a turn-over to the military as soon as it becomes evident that the military can handle the matter—these figures are far too high. I should be extremely surprised if this Board, in the next year or two, in its work on projects from the Army and the Navy for which funds would be transferred, would be able to spend more than two, or at the outside, three million dollars a year on this type of work of its own initiation.

That is subject to one qualification at the moment, namely, that if in some of the long-range work that OSRD now has, for which it has had appropriations, and which appears to be of such value to the future of the military that it should be continued, there is transferred to the cognizance of this Board for their conduct of that work, the funds which have already been appropriated, the amount of money to be administered may be large. I have had long experience with types of fundamental research and applied science research and development and the amount of money which you can spend effectively on fundamental science matters is relatively very, very small in comparison with the amount of money which is spent for secondary research directed toward specific tools and the development of those tools.

So, while the conversation and questions yesterday involved funds which OSRD has spent over the past 4 or 5 years running in hundreds of millions of dollars, there was some confusion of thought as to how that money had been spent and for what purpose.

This thing we are talking about is a very small amount of money measured in terms of the expenditures that this Government will make for its military defense, no matter what the program is. It is a trifling amount of money.

Some question was raised by one of the gentlemen here, directed to General Borden, about what OSRD has been doing.

I was instrumental in the setting up of the original National Defense Research Committee which, as Dr. Bush testified, ran for a year before the Office of Scientific Research and Development took over the control and added to it the Committee on Medical Research.

We started with a definite idea, which is almost identical with the basic idea of RBNS, i. e., of confining ourselves to a research program and turning over the results to the military for the final development.

Two things happened in OSRD under the pressure of war and our ability to organize civilian science. One was that many of the things

which early in 1940 seemed quite problematical turned out later to be quite valuable. Also the tempo of the war was so very great that the research and development departments of the services were completely overloaded with their current problems. Accordingly OSRD and NDRC steadily were forced to do the development, entirely with the approval and cooperation of the military, of specific things, that is, to do finally the kind of work which we had contemplated would go to the military.

We did not have the right kind of organization for this work. In time of war, however, you do a great many things which, measured by peacetime standards, are very extravagant and not very efficient.

As Dr. Bush testified yesterday, while the results, over-all, have been very good, yet OSRD has been led far afield from the original conception on which it was set up. That accounts to a large extent for the very considerable sums of money which have been spent, but which this Board, if continued, will not be confronted with.

There will be one vital factor in this Board's operations which will be absent from the conditions which have obtained as regards OSRD. Time is not of the essence of the job in this case, as it is in wartime when money is an insignificant factor. In wartime, if you can save time and therefore save lives by the expenditure of money through research work, that is what you do. In a way, that is what industry does in its research work, as contrasted to the slower moving work of fundamental scientists in the colleges and universities.

Mr. Johnson asked a question of General Borden on which I can throw some personal light with regard to our civil military work in 1940 or 1941.

What I am about to say is with no intent to reflect on the military or the Congress, or on the people of the United States. It is a mere statement of fact as I observed it. And I am not sure whether any deficiencies in which the military found themselves at that time were caused by a failure to see the problem in sufficient magnitude, or whether they were concerned with the forms of the appropriation acts which you gentlemen passed. But it is clear that in certain sectors, at any rate in 1939, 1940, and 1941, we were ill-prepared for the thing that confronted us. I cite it because it involves this agency, of the Academy of Sciences and the National Research Council, which is here under discussion.

When the storm clouds began to gather it was apparent to all of the sections of the military, including the medical services, that there was a huge problem to be done and little time in which to do it. In the case of the medical department, the Surgeon General of the Army and the Surgeon General of the Navy saw that their situation was so acute and their facilities were so inadequate that they turned to the Academy and Research Council for aid. They had little money for research. Whether this was because it had not been appropriated, or whether it was because it was unusable in the form in which it had been appropriated, I do not know.

They turned to the Medical Division of the Research Council with the request that the council organize a program of military medical research and get it in operation in such a way that when the inevitable happened they would have a going mechanism. They had no money which they could allocate as they normally might, to de-

fray the out-of-pocket costs of doing this work, and in order to get the thing done we, in the Academy and Research Council, went to private foundations and raised a large sum of money to set up this military research, with the result that when the war came, the OSRD and the services had a going mechanism, which has been throughout the war in effect the operating agency in the research field and the field of military medical science.

I did not make a note of some of the questions that were asked, but I think, sir, that I have answered, without being questioned, such things that occurred to me as having troubled this committee.

The CHAIRMAN. If you will permit me to say so, as far as the chairman is concerned, you seem to have covered the whole picture. I think your statement embraces everything that the committee would probably want to know about.

Mr. JEWETT. Mr. Chairman, I would like to add one thing in emphasis with regard to this Academy and my feeling about it.

I am opposed to setting up more agencies, on general principles. I am particularly skeptical about the desirability of setting up a new agency now in connection with this very intricate problem which confronts the Congress.

The reason why I am skeptical, or averse to the thing at this time, is the fact that we just do not know how we will operate or what the conditions confronting us will be in the future. We do not know what pattern Congress will finally set up. We do not know how far we can enlist the active interest of top science in this thing in peacetime. We do not know what kind of a board our experience will show is the best type of board to do the job in a way that Congress and the military want it done.

It seems to me if we can get some experience in an organization which is flexible, where we can change it readily without legislative action and deal with conditions as we find them, we will put both the military and the Congress in a far better position to make their final determination with a degree of certainty which they do not now possess.

This National Academy is not a new agency. It is a corporation which Congress set up. It is an existing agency and it operates under a very simple mandate from Congress, which is meticulously observed. Its normal operations are handled on the request of Government, on an annual basis. Those requests can be modified or discarded at any time. It has no vested interests except that of uncompensated service.

To change its operations Congress does not have to destroy an existing agency. It seems to me and, particularly considering this type of organization, which can well be employed in this interim period, when we are seeking information as to how to set up a final organization—it seems to me this type of organization can be employed to great advantage during that period.

The CHAIRMAN. Your statement, as I see it, covers the whole problem, but I want to make one request of you, and I hope the answer will enlighten this committee, if you will file with it, as a part of your statement, a revision of the figures given to us by General Borden, coming as nearly as possible to the exact requirements, giving the amount you believe will be necessary to be appropriated, we will say, for the next fiscal year, or the next two fiscal years.

General BORDEN. For 1945 and 1946?

Mr. JEWETT. Of course, the 1945 figure will be a little figure. It is the figures for 1946 and 1947 you are particularly interested in, and I think we can do that. That is under review; is it not?

General BORDEN. These are the reviewed figures.

The CHAIRMAN. I have made that request simply for this reason: This committee has the power to do whatever it wants to do, and when we get in executive session we may want to put some limitations in this bill, and those figures will be helpful.

Mr. JEWETT. We have the figures which General Borden gave you.

The CHAIRMAN. We can act on those figures.

Mr. SPARKMAN. I would like to have Dr. Jewett's comment on this, which has been running through my mind, as to the right of Congress to appropriate funds for a private corporation, and if we have that right, I would like to have your comment on the propriety of doing it.

Of course, under the basic act, the various governmental agencies have the right to ask that the Academy provide for allocating money to the Government departments with which the actual expenses are paid.

This bill, as it is drawn, seeks to authorize a direct appropriation from Congress to an agency outside of the Government, a private corporation.

I doubt very seriously our right to make such an appropriation, and if we have the right, I wonder if such a precedent has ever been set, or if it would be proper to do so. It seems to me that there is a difficulty we are going to have to get around.

Mr. JEWETT. Of course, you are asking a legal question of a layman.

Mr. SPARKMAN. I thought perhaps you had given some thought to it.

Mr. JEWETT. I have given some thought to it, but as I see it, under the machinery you set up, whether this committee or the Committee on Appropriations would consider the matter, no appropriations will be made without the presentation of the case, which Congress may accept, or modify, or may decline.

What will that case be? It will be the judgment of this Board, confirmed by its parent, the Academy, that in their opinion, for the next fiscal year this amount of money will be required to defray the out-of-pocket expenses for this operation. So you will not be appropriating money to an outside agency for anything except to defray the costs of the thing which the act of incorporation provides for.

The CHAIRMAN. Let me interrupt you to help my colleague out in connection with a matter with which he possibly is much more familiar than anybody else except myself, and that is the fact that we have set up a private corporation in the Tennessee Valley Authority for which we have appropriated more than \$800,000,000, and that corporation is authorized not only to compete directly with industry, but it is a right expressly reserved in the charter, which indicates that the old statesmen of the 1860's were more careful about private enterprise, perhaps, than the modern Congress.

Mr. SPARKMAN. There is no connection between the Tennessee Valley Authority, and the Panama Railroad and the Reconstruction Finance Corporation and the 106 other governmental agencies. They are Government corporations. This is a private corporation.

The CHAIRMAN. So is the Tennessee Valley Authority a private corporation.

Mr. SPARKMAN. No; not at all. This was chartered under an act of Congress just like the Red Cross, or the American Legion, or the Boy Scouts, and organizations of that kind. They are private organizations.

Mr. JOHNSON. Is there any comparison between this organization and the Smithsonian Institution?

Mr. SPARKMAN. The Smithsonian Institution, I believe, is a Government agency. I am sure it is.

Mr. JOHNSON. But we do appropriate money for it; do we not?

Mr. SPARKMAN. It is a Government agency.

The CHAIRMAN. Well, this is set up for Government agencies to deal with.

Mr. JOHNSON. This Board will be a Government agency.

Mr. SPARKMAN. No; not at all. This is a very real question.

The CHAIRMAN. I think we ought to get the legislative counsel over and settle that among ourselves.

Mr. SPARKMAN. But if they are not prepared to tell us on that, I do think it deserves some study and very careful consideration ought to be given to it.

Goodness knows I am for this project, but I think we have a great big stumbling block.

Dr. JEWETT. May I answer in a very simple way? Of course, this thing has been pointed out, that this corporation which Congress set up was set up primarily to aid the Government. It has to do other things, but it is primarily to aid the Government, and it was done in order to be sure it got unbiased advice, not influenced by political or other considerations.

It is true this bill contemplates a bigger appropriation to this corporation than any which Congress has ever made. I have not looked up the back history carefully, but in the early days of the Academy, up to about the time of the Panama Canal building and the formation of the national park system, Congress itself turned to the Academy on numerous occasions and asked that certain things be done, and money obviously had to be appropriated in some way to defray those expenses.

It is true that in those days things were a good deal simpler in the Government than they are now. We had no Bureau of the Budget; had no Comptroller General, and the record shows that in the work the Academy did for the various departments under its charter they agreed as to what had to be done; the Academy rendered bills for expenses incurred and the bills were paid.

Mr. SPARKMAN. But those bills were rendered to the departments?

Dr. JEWETT. Yes.

Mr. SPARKMAN. In satisfaction of a contractual relationship?

Dr. JEWETT. No; there were no contracts in those days, but the thing I am citing is simply that in the early days of the Academy there were clearly things which Congress itself asked the Academy to do for it, not the departments, and which involved money.

Mr. SPARKMAN. Of course, Congress appropriates money in its own contingent fund with which it may pay expenses.

Dr. JEWETT. I do not know about these things, but Congress makes big appropriations and has for years, in carrying out the Morrow Act, to State universities and land-grant colleges and other institutions. They do that.

The CHAIRMAN. Yes; plenty of them.

Dr. JEWETT. It seems to me there are an infinite number of cases in which Congress appropriates money—

Mr. SPARKMAN. But I believe you will find those appropriations are made to a department of the Government and the fund is administered there and disbursed.

The CHAIRMAN. Well, anyhow, he is a layman and cannot answer that.

Mr. SPARKMAN. I want to make clear that I am offering no objection to it. I am for this program, but I think you have an obstacle there that must be worked out.

Dr. JEWETT. Do not say "you." I am on the receiving end of this thing.

Mr. ELSTON. I would like to ask Dr. Jewett this question: Under your original charter—and I have read it and have it here—it is provided that the National Academy of Sciences shall aid the Government departments and that appropriations may be made. As indicated by the gentleman from Alabama [Mr. Sparkman], those appropriations are made to Departments that are seeking assistance, and the original charter specifically provided that no compensation whatever for any services to the Government of the United States shall be paid to the National Academy of Sciences.

Also, I read the letter of the Secretary of the Navy, approved by the Secretary of War, dated November 9, 1944, and they do not request what is in this bill at all. If you will read the concluding paragraph, they say that funds for the Board shall be approved as separate items to be included in the annual War Department and Navy Department appropriation bills.

Dr. JEWETT. That is right. I called attention to that in my statement.

Mr. ELSTON. Yes. They do not ask that this Board be recognized as an agency for the purpose of coming to the Appropriations Committee and requesting a separate appropriation and, when you do that, you in effect are setting up a separate, independent agency of the Government that may be clear outside of the Government and, as Mr. Sparkman indicated, can be a private corporation. But when you say they can come to the Appropriations Committee and can request direct appropriations, you certainly are setting up a permanent institution of the Government.

And the letter of the Secretary of the Navy and the Secretary of War further indicates that the program they are describing in that letter shall be carried out pending action on the recommendation of the Postwar Policy Committee, which was a temporary thing; yet, in this bill, H. R. 2946, we seek to set up a permanent organization which the War and Navy Departments do not want set up at this time.

The CHAIRMAN. Mr. Elston, you do not seem to grasp what this bill does.

Mr. ELSTON. I can understand the bill and I can understand the letter of the Secretary of War. I have them both before me.

The CHAIRMAN. This bill does not set up anything, but merely authorizes appropriations to the Academy of Sciences.

Mr. ELSTON. Yes.

The CHAIRMAN. And this committee, of course, will put any necessary restrictions on it that it wants put on. And I have in mind to ask for a rewrite of this bill, because it is not my bill and I have repeatedly said here I was going to be particularly careful to see that the Comptroller General kept his hands on it.

Mr. ELSTON. Even so, Mr. Chairman, the bill clearly provides that appropriations are to be made direct to this agency, and not to the War and Navy Departments.

The CHAIRMAN. I can give you the reason why it was drawn this way. The Postwar Policy Committee discovered, as this committee has discovered many times, there is a conflict between the Army and the Navy and the question arose as to whether one agency might block the other; therefore, they wanted to make the appropriation direct to the Academy to prevent that.

Mr. ELSTON. I do not think the War and Navy Departments block each other on any matter affecting national defense.

Mr. CLASON. I think, along the line Mr. Elston pointed out, it is significant that Dr. Bush in his testimony yesterday, on page 10, said he would eliminate entirely this proposition they put in H. R. 2946, whatever it may result in, so they could move directly to the establishment of an independent and permanent research agency. In other words, Dr. Bush's testimony yesterday definitely was to the effect he wishes to set up a permanent independent agency.

The CHAIRMAN. Well, do you want to set up an outside agency?

Mr. CLASON. That is not the question. I am asking the questions, if I can, and not have too many witnesses here.

Is it your view this is only a stopgap proposition and ultimately it would be desirable to establish an independent and permanent research agency?

Dr. JEWETT. My answer to that is I do not know what the ultimate thing is. Personally, I am skeptical about setting up an outside agency (not, as I understand it, an agency of the executive department of the Government), to mess into the military affairs of the country.

Mr. CLASON. I am in agreement on that. I think everybody on the committee has been worried about that. That is exactly what this does.

Dr. JEWETT. Yes. And I was one of the minority. We divided seven to six in the Wilson committee on the desirability of going immediately to the Congress for a permanent agency, and the report of the committee to the Secretaries was very explicit in the way in which the recommendation was worded. It did not say the committee advocated that; it said a majority of the committee, which was the literal truth. It was seven to six. And the minority comprised three of the four scientific members, Dr. Compton, Dr. Hunsaker, and myself, and three of the military members who had been most concerned with research. The reasons we were reluctant to do that were those I made in this statement, namely, that we did not know enough to advise Congress as to the make-up of such a body, even though Congress was receptive to it.

The CHAIRMAN. Would you have any objection to filing a copy of that report of your committee to be made part of this record?

Dr. JEWETT. I do not know whether I am entitled to do that. I think if you made that request to the Secretaries of War and Navy, they would give it to you.

The CHAIRMAN. If you have it, I just want to get it in the record.

Mr. CLASON. I think it should be in here, too.

Dr. JEWETT. As far as I know, there is no reason at all for not doing so; so far as I know, it is a public document. If it is your wish, I will get a copy and send it to you.

(Copy of report appears at close of testimony.)

Mr. CLASON. In view of that letter of 1944 to which you referred in your prepared statement, from the Secretary of War and the Secretary of the Navy, I have had difficulty in seeing why there was any need for this H. R. 2946, except for the purpose of establishing an agency—perhaps not permanent, but an intermediate agency; because, as I see it, if the Army and Navy get their appropriations and you have the National Academy of Sciences, it would seem to me they could work out a proposition without having direct appropriations from the Federal Government to the National Academy of Sciences as set forth in section 1.

Another thing that has been worrying me here, Dr. Jewett, is this proposition—

Dr. JEWETT. May I answer that before you go to the second?

Mr. CLASON. Yes.

Dr. JEWETT. As far as I know, the explanation of this H. R. 2946 is the one the chairman gave as a means of simplifying the thing.

As far as the Academy is concerned, if we are going to have to do this thing at the request of the Government, the only thing we are concerned with is in obtaining reimbursement of the actual expenses. How the departments and how the Congress set up to do that is none of our concern.

Mr. CLASON. Then, as a matter of fact, so far as this bill is concerned, if the National Academy of Sciences is assured it is going to get its funds either from the Navy or Army appropriations, or both, then you would say there was no need of section 1 in the bill; that you can carry on work under some mutually satisfactory arrangement made between the National Academy of Sciences and the Department?

Dr. JEWETT. I think the answer to that would be "yes." My information both from my discussions with Mr. Woodrum's committee and my discussions with the military is that the way appropriations are made to the Army and Navy concerning this sector of the work is a cumbersome piece of machinery to use, even under a contract.

As I understand it, to carry out the intent of Mr. Stimson's and Mr. Forrestal's letter under the present appropriation acts, by contract, they are going to have to get this money piecemeal from a lot of different departments of the Army and Navy, and put it together, and it is a cumbersome type of thing. It makes no difference to the Academy and the Research Board how they do it, if they do it.

Mr. CLASON. I think that is a matter of policy that can be worked out by you men.

I was also interested in another thing. We started the hearing here yesterday, apparently, without any report from the War Department on the bill; yet today we get a report from Secretary Stim-

son which indicates section 2, in his opinion, ought to be out of the bill, and also refers to the fact that the House Select Committee on Postwar Military Policy had actually drafted a bill which, with the exception of this section 2, was in the exact form the Secretary of War and War Department would desire.

I was wondering if you knew why it was the bill was not introduced in that form?

Dr. JEWETT. I have no knowledge, sir.

The CHAIRMAN. Let me explain to Mr. Clason again that I introduced this bill at the request of the Postwar Military Policy Committee before they made their report. They then made a report striking out the provision in section 2 which prohibited the Comptroller General from checking the accounts, and that was very agreeable to me.

In the second place, the Postwar Military Policy Committee had no business suggesting any bill to this committee, because they are just a policy committee to determine whether certain agencies should be set up or not, and we will write our own legislation.

Mr. CLASON. The next part of the report that interested me was that the Bureau of the Budget has not yet expressed any opinion on its part as to whether this legislation conforms to the program of the President. I was wondering whether you have brought this to the attention of the President and know whether or not he favors it?

Dr. JEWETT. No, sir; it is none of my business to bring it to the attention of the President.

Mr. CLASON. I mean the National Academy of Sciences has never directly taken the matter up with the President, has it?

Dr. JEWETT. Absolutely not. Why should we?

Mr. CLASON. I am sure I do not know, but I am just trying to find out.

Dr. JEWETT. No. That would be an intrusion on our part in something that is none of our business.

Mr. CLASON. Then I think the members of the committee and everybody is in agreement on the proposition that in this type of research work the question involved is how to carry it out and, as I get your testimony, you were a member of the minority group in favor of the proposition of not setting up any further agency of the Government, or any agency to carry on this work, or to direct it, and so long as funds are available to the National Academy of Sciences and to the Departments which explain to you what they want and furnish you with the funds, the work will be carried on under existing conditions?

Dr. JEWETT. I would say the answer to that is "Yes" with one modification—I do not know what the future has in store. It may be when Congress gets through and has had more experience it will regard an independent agency as the right thing. I do not agree to that now.

Mr. CLASON. My thought is we are taking up this legislation now apparently when we are acting in the dark. We do not know exactly what we are going to need in the future. We are willing, I am sure, to vote whatever funds are necessary to carry on this research work properly, but it would be far better, as you see it now, to wait for a

period to find out what the future develops and then go ahead with an independent agency, or whatever may be needed. Is not that your attitude?

Dr. JEWETT. Yes. I can summarize my views very briefly. I think to conserve existing values that some agency—and I know of no better one than the one the Secretaries of the Army and the Navy have asked the Academy set up—should be set up immediately, because things are dissolving with OSRD very fast, and if we do not have this thing in operation we are going to lose the continuity which exists.

I have not the slightest idea of how far we can go in peacetime in enlisting top civilian science people in a continued interest in military affairs. The whole thing is repugnant to the ordinary civilian-life ways of scientists—the restrictions under which they have to operate, and the cellular structure. The uniform experience in talking to all of the men who have given a lot of time and effort, to OSRD, is that they want to get out of this thing and get back to their work as soon as possible. So we have an experimental period ahead of us.

That leads to one more thing. I was instrumental in setting up the original National Research Council of World War I, and also the permanent National Research Council, and participated over the years in its operations, and I know what happened in the twenties and thirties. When Mr. Wilson issued that Executive order, we had pretty nearly the same kind of discussions that we have been having this last year; of the desire to maintain the cooperation and to maintain the interest of civil people in military affairs. The wording of the Executive order, while it specifies other things for the Research Council to do, had in the background as its genesis the idea to perpetuate this cooperation. And I will say that we and the military struggled mightily in the early years of the twenties to make that thing go and it did not work.

Mr. JOHNSON. And the reason you failed was because you did not have an interim group to take care of it. Is not that the reason?

Dr. JEWETT. That is one of the reasons.

Mr. JOHNSON. That is why it failed to work; is not that true?

Dr. JEWETT. That is one of the reasons. The other reason is, as you people all know—and this is no reflection on anybody; certainly no reflection on the Congress—we got into a period of ending militaristic policy. You just could not get any money. We were in a period when we were taking battleships out to sea and sinking them; we were in a period that anybody who tried to invent a new type of powder or explosive was heralded on the front pages of the news papers as a merchant of death, and the darn thing simply would not work.

In addition to that, the civil scientists then, as I think they will be now, were not desirous of spending too much time on things which did not permit them the ordinary methods by which they work—meeting with their kind and publishing their results.

Mr. CLASON. There were a lot of things of that kind. Then, as I say, under section 1 this group can be set up in the War and Navy Departments, an interim group, without any legislation, so that there is not going to be any hiatus whatsoever. So the only thing this bill is for then is to authorize a direct appropriation to the National Academy of Sciences. And, as I understand, your position is that so long as funds are available you do not feel that is necessary.

Dr. JEWETT. That is the only thing. We have no money, and if we do the things that the Government requests, we must have reimbursement, and I am assured by my contacts with the military and my contacts up here through Mr. Woodrum's committee, that this is a simpler way of doing the thing. I am not cognizant of your internal arrangements.

The CHAIRMAN. I want to get one thing clear. Are you for this bill or against it?

Dr. JEWETT. Personally, I am for the bill.

Mr. ELSTON. I want to say I agree fully with what you say, Dr. Jewett, and I think we would be exceedingly short-sighted if we did not go into research and development to the fullest extent, so as not to have the same situation developed that developed after World War I. But we are concerned now in this bill with whether or not we want to set up this agency and whether or not that is the way to accomplish it. I think that is the only question before this committee.

I suppose every member of this committee and every Member of Congress agrees with what you have to say about what we ought to do; but, reading the letter of the Secretary of War and the Secretary of the Navy, I find they suggest something that can be accomplished without any legislation at all. And until we reach that time when we must pass on the question of whether or not we want to set up a permanent agency, you want a temporary plan; you have just indicated that. I think we all agree with that. I think we realize we are not yet to the place where we can determine upon the permanency of any agency. I think it would be a mistake to set up a permanent agency before we reach that place. And if we set up the kind of agency the Secretary of War and Secretary of the Navy indicate they want in this letter—and I believe you want the same thing—we do not have to have any legislation at all, and that kind of agency can function perhaps for years and, by that time, we will have the benefit of that agency's experience and then we can pass on the question of whether or not we want a permanent agency.

The CHAIRMAN. Can we not wait until the committee is in executive session to work out the mechanics?

Mr. ELSTON. You asked the doctor the question whether or not he was for this bill.

The CHAIRMAN. Yes.

Mr. ELSTON. I would like to ask him if he is for the plan set up by the Secretary of War and Secretary of the Navy in their letter of November 9, 1944.

Dr. JEWETT. I will have to answer that question that not only I am for this bill because I have been assured, as I have indicated, by both the Army and the Navy people and by Members of your House that this is the simplest way of insuring that this thing will be carried on; but, if it was finally determined to do it along the lines of section 11 of the Secretaries' letter to which you referred, I think it is imperative that separate items be included by specific amounts in their acts of appropriation. I say this because I know what happens if it is simply a part of the money appropriated for research and development of the Army and Navy in times of peace—the urgency of the demands of the military services themselves will leave nothing for this more fundamental thing. So it seems to me if you finally adopt—not this bill, we are here discussing, but the methods

suggested in the Secretaries' letter, which is the only method they had when they wrote this letter, then I think, if you think this work is worth doing, you must put into their acts of appropriation items which are specifically earmarked for this purpose; otherwise this work won't go on.

Mr. ELSTON. Well, you can do that without this legislation.

Dr. JEWETT. Surely; you can do whatever you want.

Mr. ELSTON. In other words, they can come in and ask for the items they want, just as they can ask now.

Dr. JEWETT. But from the assurances I have, the answer to your question is the one I gave Mr. May—if this is what Congress wants to do, that it will make it possible for them both to operate, and to operate easily.

Mr. ELSTON. And they can also operate under the plan prepared by the Secretary of War and Secretary of the Navy.

Dr. JEWETT. Certainly, if the plan brings the desired amount of money.

Mr. ELSTON. Yes.

Dr. JEWETT. The only question as far as the Academy and this Board is concerned, is that the work which has been agreed upon as necessary to be done and which they have all agreed upon, which means those with the civilian point of view and with the military point of view, after approval by Congress, if that work is to go on, necessarily the wherewithall has to be provided.

Mr. JOHNSON. You want one place where you can do this whole job at once, at least to get the funds for research? Is not that really your point?

Dr. JEWETT. It may be one or two; preferably just one.

Mr. JOHNSON. But you do not want 25?

Dr. JEWETT. No.

Mr. JOHNSON. And you think this bill does that for the time being?

Dr. JEWETT. I think this is one place to go.

Mr. JOHNSON. And under that assumption, you are for it?

Dr. JEWETT. Yes.

Mr. JOHNSON. You do not care what mechanics we adopt, if they get the thing you think is necessary?

Dr. JEWETT. That is right. Under the joint letter from the Secretaries, the only way they can now work it out, is that they cannot have a single contract, they are forced to have two contracts. Further because of the differences in the acts of appropriation to the two Departments, those contracts, I am assured by those who are trying to draft them, while in substance they are the same, they have got to be worded differently. For instance, say the Academy and the Board spend X millions of dollars, coming Y millions from the Army and Z millions from the Navy, they are compelled to watch their step carefully because of the differences in the specific contracts under which they receive and spend that money.

Mr. ELSTON. Now represented on the Board are representatives of the Army and Navy.

Dr. JEWETT. Yes; but at the present time, what I suggested to Mr. Stimson and Mr. Forrestal is that what they really need is for one Department to act as the agency of the other one, and to transfer

the funds among themselves, so they will have a single contract. But they assure me that cannot be done; they have to have two contracts.

Mr. JOHNSON. You do not want to get involved in interdepartmental fights, do you?

Dr. JEWETT. No.

Mr. JOHNSON. Otherwise, we would lose the whole thing—lose the scientific research.

Dr. JEWETT. In these contracts, they are trying to eliminate us from their internal squabbles, but they do assure me that the only way they can make the necessary appropriations to the Academy for research today is by taking it from different specific appropriations for research and development made to the different departments of the services, and it is just a big job on their hands to collect this necessary money together so that they can make a contract.

Mr. MARTIN. Dr. Jewett, you are confronted on the one hand with setting up the National Academy of Sciences, as contemplated in this bill, or of setting up a new agency of some kind in the Government to handle this, or, in the third place, handling it through already established Departments of the War and Navy on a dividing basis? Those are the three things that confront you?

Dr. JEWETT. I am not quite clear. I am not concerned with any problem of setting up the National Academy of Sciences. That is already set up.

Mr. MARTIN. But this bill is contemplating using the National Academy of Sciences.

Dr. JEWETT. That is right.

Mr. MARTIN. That is one method of approach?

Dr. JEWETT. That is right.

Mr. MARTIN. Another method is that we set up a new governmental agency?

Dr. JEWETT. That is right.

Mr. MARTIN. And a third one is to do the work through the War and Navy Departments as you described a moment ago through picking up parts of various funds and throwing them together for this purpose.

Now, why cannot we set up this authorization simply by earmarking the authorization of a given outside limit for a given period of time for fundamental research work so that the Departments do not have to pick it up from various items in a cumbersome way? Why cannot we just pass an authorization bill?

Dr. JEWETT. Personally, that is what I thought could be done and should be done; that there would be an item in the appropriation act—this probably was out of my ignorance—that in the act making appropriations, we will say, to the Army, there would be two items concerned with research and development; one for research and development in their own establishment, which would be a big figure—

Mr. MARTIN. Yes.

Dr. JEWETT. The other of an amount specifically earmarked for separate research by the National Academy of Sciences.

Mr. MARTIN. Exactly.

Dr. JEWETT. And that would be earmarked so that in the stress of grabbing for funds when funds were scarce, the money which Con-

gress wanted to have spent in this sector would not be frittered away in the demands of the others.

That was my original idea of the way the thing was done. But, as Mr. May has explained, when I met with Mr. Woodrum's committee, they pointed out the fact that it was a cumbersome method of doing it, because of the fact the appropriations to the Army and Navy are made after hearings before separate committees of the House and Senate, and they might and almost certainly would take diverse points of view on the thing.

Mr. MARTIN. You mean in establishing the amount of the appropriation?

Dr. JEWETT. That is right.

Mr. MARTIN. If we pass a simple authorization for later appropriations for specific purposes, that of fundamental research work, we can thereby avoid any future entanglement and messing up of different funds and having to reach into different funds, but weld together the funds you are looking for; we can also thereby avoid a challenge on the House floor, on a point of order, that it is legislation in an appropriation bill, and we can have it fully authorized and distinctly authorized for the purpose you are seeking.

The only thing we leave thereby unsolved is this competition they fear between the Army and the Navy, and I have an idea if we do label it clearly and distinctly for the Navy and Army, that they can hereafter seek appropriations up to the limit we establish for this specific purpose, and I am not so fearful of the clash between the Army and the Navy on the seeking of these funds in future appropriations to carry out a portion of the research that is advisable.

Now, if the Army and the Navy show a disposition to fight each other on that matter. I think then we can give attention to creating a joint agency of some kind and still have them authorized to use a specific fund.

Dr. JEWETT. I do not have any difficulty—this thing we are talking about was not a fight between the Army and the Navy per se—

Mr. MARTIN. I was speaking of your statement.

Dr. JEWETT. No. As I get it from talking with some of the conferees of Mr. Woodrum's committee, the difficulty resides in the machinery of the House itself—the fact that two applications for funds, one from the Army and one from the Navy, go to different groups in the House and Senate; that they might start with a reasonable thing, but come out with a different result.

Mr. JOHNSON. Does not your bill do exactly what Mr. Martin wants—appropriates money for general research?

Dr. JEWETT. That is right.

Mr. JOHNSON. That is exactly what your bill does.

Dr. JEWETT. Do not call it my bill.

Mr. JOHNSON. Does not the bill of the War and Navy Departments do that?

Mr. MARTIN. This bill does seek to do that. This bill, instead of leaving that within the Army and Navy, seeks to give it directly to the National Academy of Sciences, and my idea was to leave it in the established agencies now.

Dr. JEWETT. You can be assured of one thing. The way this Board is set up, any request to Congress after it comes, whether to

the Appropriations Committee or some committee you set up, you can be sure of one thing, that since the Board is made up half and half of top military people and top scientists, it will not be counter to the views of the military. It cannot conceivably be that.

Mr. MARTIN. I have only this thought in mind in making my statement here. I am sorry it is quite so long. I had in mind avoiding making a direct appropriation to an agency that is in a sense independent and apart from the Government in governmental matters; on the other hand, I do not want to hamstring the work you are trying to do. I think it is vastly important. Now, we can authorize this and earmark the authorization and assure future appropriations.

Dr. JEWETT. I am sure as I am sitting here, it is too important to hamstring.

Mr. MARTIN. And all that we do is to let them go to the subcommittee of the Navy and the subcommittee of the Army for their inclusion of any part of the authorized sum in a future appropriation bill. That is as far as the division would go in the Appropriations Committee of the House and the Senate, but I cannot see how that would defeat your purpose of accomplishing this research.

Dr. JEWETT. Of course, you are talking about something that I am in ignorance of—that is, the machinery you should have.

There is one more thing I would like to have the record show. I think possibly it is unnecessary, but, if we are going to get values out of this thing we are talking about, I am absolutely convinced it must be done by a board similar to this, however it is constituted, acting independent of an operating agency. My whole experience has been in industrial research and I subscribe entirely to what Dr. Bush said yesterday that fundamental research cannot be under the direction of an operating agency. We found that out in industry. We all started out 40 years ago with the idea our research agency should be under an operating agency, because it knew the problems. But the thing did not work and there is not a single great industrial laboratory now under an operating agency. The War and Navy Departments are operating agencies and they simply cannot—it is no reflection on their brains; it is a condition of their operation—they cannot do these kinds of things that this sort of board or OSRD are able to do.

Mr. MARTIN. That makes it very important that we have this statement the chairman asked you to compile—the needs you see in the field of fundamental research.

Dr. JEWETT. You mean this monetary thing?

Mr. MARTIN. That is right.

The CHAIRMAN. I want to have put in the record at this point the letter from the Secretary of War, and particularly the third paragraph at the bottom of the letter where he comes out emphatically for this legislation with the modification I have suggested, and the comment furthermore that in the hearings of the Postwar Policy Committee that the War Department and Navy Department have sent representatives to sponsor the authorization of these funds to the National Academy of Sciences, and gave their reasons for it.

Mr. ELSTON. Will any of them appear before this committee?

The CHAIRMAN. No; this committee has not had those gentlemen before it.

Mr. ELSTON. Well, this is the legislative committee and not the other committee.

The CHAIRMAN. That is what I am trying to tell you, that we are going to write our own bill.

(The letter of the Secretary of War referred to by the chairman is as follows:)

MAY 23, 1945.

HON. ANDREW J. MAY,

*Chairman, Committee on Military Affairs,
House of Representatives.*

DEAR MR. MAY: The War Department favors the enactment of H. R. 2946, Seventy-ninth Congress, a bill authorizing appropriations for a permanent program of scientific research in the interest of national security, except as noted in paragraph 4 below.

This bill authorizes that sums be appropriated by Congress to finance scientific research to be conducted by the National Academy of Sciences through a Research Board for National Security. This Board is composed of both scientists and Army and Navy officers, and was recently established at the request of the Secretary of War and the Secretary of the Navy.

The Research Board for National Security provides for the continuation of the kind of partnership between the military and scientists which has been so fruitful during the war. It is believed that its organization under the National Academy of Sciences will provide the flexibility, independence, and prestige necessary to attract the best scientific talent for undertaking research for national security.

Pursuant to section 2 of this bill, the funds appropriated would not be subject to review or audit by any agency of the Government. This provision is not in accord with established governmental fiscal procedures which the War Department sustains. Therefore, the War Department favors section 2, as drafted in report 2 of the House Select Committee on Postwar Military Policy, which proposes legislation identical with H. R. 2946, except that the exemption from review or audit is eliminated.

It is therefore recommended that bill H. R. 2946 be passed after amendment to conform with the proposal of the House Select Committee on Postwar Military Policy.

In view of the necessity for expediting this report, it is submitted without a determination by the Bureau of the Budget as to whether the proposed legislation conforms to the program of the President.

Sincerely yours,

HENRY L. SWIMSON, *Secretary of War.*

SEPTEMBER 18, 1944.

The Honorable SECRETARY OF WAR.

The Honorable SECRETARY OF NAVY.

SIRS: On June 22, 1944, the Honorable Secretary of War and the Honorable Secretary of Navy established a Committee on Postwar Research which was requested to study the various aspects of the postwar research and development needs of the War and Navy Departments, and to recommend a plan for carrying on such work after the war.

As chairman of the Committee, I desire to submit the attached report of the Committee on Postwar Research.

Respectfully,

CHARLES E. WILSON.

SEPTEMBER 14, 1944.

REPORT OF COMMITTEE ON POSTWAR RESEARCH

PURPOSE

The Committee on Postwar Research was set up by the Secretary of War and the Secretary of Navy under date of June 22, 1944, to study the various aspects of the postwar research and development needs of the War and Navy Departments and to recommend a plan for carrying on such work after the war.

DISCUSSION

In attacking the problem of how best to keep postwar military research in the forefront of national preparedness, your committee has taken for granted that the Army and the Navy must continue to carry the major responsibility for such work, especially in times of peace. Experience with the Office of Scientific Research and Development during the past 4 years, however, has demonstrated that scientists in civilian life, when given the opportunity, are capable of making outstanding contributions to the invention, development, and operation of all manner of instrumentalities of war. Obviously, the Government cannot, after the war, continue to employ on military research all of the scientists who were mobilized under the OSRD for such work during the war. Furthermore, the great majority of these men would not be willing, after the war, to devote all of their time to such work. Nevertheless, a way should be found for keeping the country's outstanding scientists interested in military research after the war, so as to give the Army and the Navy the continued benefit of their thinking and of their assistance. The committee is recommending, therefore, a plan which it is believed will make the highest level of scientists in the United States available to the armed services in times of peace as consultants, planners, and collaborators. It is desired to stress that any plan to be effective must have, of course, the full support of the War and Navy Departments.

Your committee believes that the best device for carrying out the above objective is the prosecution of scientific research by contracts under a Board composed of civilians of distinction in science, engineering, and industry; and of officers of the Army and of the Navy who have important responsibilities in connection with research and development work. The National Advisory Committee for Aeronautics is an example of an agency, functioning in this manner, which has successfully assisted the War and Navy Departments in dealing with the problems of aviation. The principal objection to a Board of this kind is that it must be rather large in order to be truly representative of all of those who are outstanding in scientific research in civil life and who, in the Army and Navy, have responsibilities for such activities. The committee believes that this objection can be met by limiting the Board to not in excess of 40 members, composed of about 20 civilians and of about 10 officers each of the Army and of the Navy. In order to offset the working handicap of so large a Board, the committee considers that a small executive committee, acting under general rules approved by the Board, should administer and supervise the activities of the Board. Such an executive committee would consist of 5 members, including 3 civilians, one of whom should be the chairman of the Board; and, of one Army officer and one naval officer actively engaged in the coordination of research and development in the War and Navy Departments, respectively.

The committee considers it of major importance that there should be, in both the War Department and the Navy Department, an officer of high rank and of appropriate experience engaged full time on the coordination of research.

In the plan we are recommending, it is proposed to utilize the advice of the National Academy of Sciences in the selection of the civilian members of the Board. This, we feel, will insure the selection of the most highly qualified personnel and will lend prestige to an invitation to serve on the Board.

Your committee devoted a great deal of study and discussion to the question of whether such a Board should be set up under the congressional charter of the National Academy of Sciences or whether it should be established by legislation as an independent agency. It will be noted from the drafts, enclosure (a) and (b), submitted herewith, that the composition and method of selecting the personnel of the Board, the organization of the Board, and the general procedure governing its operation are identical for the two plans. The difference between them, principally, is one of financing such research as will be carried on by the Board. If the Board operates under the charter of the National Academy of Sciences, funds for expenditure by the Board will be provided as especially earmarked items in the Army and Navy appropriation bills, in addition to any money that may be made available for this purpose to the National Academy from other sources. Earmarking such items may require legislative authorization. Many of the members of your committee feel that the difficulty of obtaining adequate funds in this manner will be greater and the effectiveness of the Board may be more limited than if the Board, functioning as an independent agency, is in position to go to Congress directly for its funds.

The advantage, on the other hand, of now setting up such a Board under the charter of the National Academy of Sciences is that this can be accomplished without loss of time by request of the Secretary of War and the Secretary of the Navy. In view of the possible early dissolution of OSD R it is important that means should be provided promptly for continuing certain of the activities of that office. The Board, if set up under the charter of the National Academy of Sciences, can be reorganized at any time as an independent agency, on the enactment of appropriate legislation.

RECOMMENDATIONS

After full consideration of all the circumstances, your committee submits the following recommendations:

(1) As a majority of the committee is of the opinion that a Research Board for National Security should be permanently established by Congress as an independent agency, it is recommended that appropriate legislation for this specific purpose be requested of the Congress along the lines of the draft, enclosure (a).

(2) As an immediate measure, the committee recommends that the National Academy of Sciences be requested to establish without delay a Research Board for National Security. A recommended request to the Academy for this purpose is attached, enclosure (b).

T. A. Solberg, for E. L. Cochrane, Rear Admiral, United States Navy; K. T. Compton; O. P. Echols, Major General, United States Army; J. A. Furer, Rear Admiral, United States Navy; J. C. Hunsaker; G. F. Hussey, Jr., Rear Admiral, United States Navy; C. E. Wilson; F. B. Jewett; D. C. Ramsey, Rear Admiral, United States Navy; W. F. Tompkins, Major General, United States Army; M. A. Tuve; A. W. Waldron, Major General, General Staff Corps; R. M. Osborne for T. D. Weaver, Brigadier General, General Staff Corps.

Enclosure (a)

RESEARCH BOARD FOR NATIONAL SECURITY

Preamble

A BILL To establish a Research Board for National Security to insure the continued preparedness of the Nation along farsighted technical lines by providing for the application of scientific research to national security; to provide a means of utilizing in times of peace as well as war the services of the outstanding scientists of the Nation in the planning and executing of military research. To this end full recognition is given that an essential characteristic or progress toward the solution of problems in scientific and industrial fields is the provision of opportunity for parallel attack under independent direction and recognition that this procedure is not costly duplication

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

1. A Research Board for National Security is hereby established and the President of the United States is authorized to appoint not to exceed forty members. The membership shall include an Army officer charged in the War Department with the coordination of research and a naval officer charged in the Navy Department with the coordination of research, the Chairman of the National Advisory Committee for Aeronautics, and such chiefs of services or divisions of the War Department and such chiefs of bureau and offices of the Navy Department as the Secretary of War and the Secretary of the Navy, respectively, may, from time to time, recommend and the President approve; together with a number of civilian scientists, engineers, or industrialists approximately equal to the number of officers of the Army and Navy on the Board. The civilian members shall be nominated to the President by the National Academy of Sciences. Initial appointments of civilian members shall be for terms of one, two, three, and four years, apportioned as the President may determine, and thereafter appointments shall be for terms of four years, except that in case of a vacancy, appointment of a successor shall be for the unexpired portion of the term. Civilian members may be reappointed but, except in case of a national emergency, continuous membership shall not exceed two terms.

2. It shall be the duty of the Board to formulate programs of scientific research and development relative to problems of national security, to direct and conduct the scientific study of such problems, and to advise the Secretary of War and the Secretary of the Navy on the applications of science to national security. Science is here broadly interpreted to include the employment of scientific methods of analysis, experiment, and test in any branch of science or technology, including engineering, medicine, psychology, and biology. Special consideration shall be given to possibilities arising from progress in science and technology. The Board shall in no way relieve the Army, Navy, or other governmental agencies of their responsibility for, or authority over, research and development work under their legal cognizance.

3. The Board shall take proper measures to safeguard classified information.

4. The Board shall submit an annual report to the Congress through the President, and at intervals of three to five years shall request the President to appoint a committee to review the activities of the Board and to submit a report to the President, the substance of which shall be made available to the Congress.

5. Members of the Board shall serve, as such, without compensation. The Board is authorized to utilize the services of consulting experts who serve as such without compensation.

6. The Board shall elect annually its chairman and vice chairman from its civilian membership.

7. There shall be an executive committee of five members consisting of the Chairman of the Board, who shall be chairman of the executive committee, an Army officer and a naval officer charged in their respective departments with the coordination of research, and two civilian members elected annually by the civilian members of the Board.

8. The executive committee, acting under general rules approved by the Board, shall administer and supervise the activities of the Board.

9. The Chairman of the Board, with the approval of the executive committee, may execute contracts without respect to section 3709 of the Revised Statutes, for personal services and materials in the making of reports, investigations, tests, models, or apparatus deemed necessary to promote national security.

10. The Board shall make use of existing laboratories, where practicable, and shall not operate laboratories under its own auspices.

11. The Chairman of the Board, with the approval of the executive committee, may transfer funds to other governmental agencies for special research projects.

12. Other rules and regulations for the conduct of the work of the Board shall be formulated by the executive committee and approved by the Board.

13. Annual appropriations of such amounts as may be necessary are authorized for: Scientific research; office supplies and equipment and miscellaneous expenses, including personal services in the field and in the District of Columbia and including one Director at \$15,000 per annum and two Assistant Directors at \$10,000 each per annum, who shall be appointed by the executive committee of the Board without regard to civil-service laws and regulations or the Classification Act of 1923; purchase, maintenance, and operation of motor-propelled passenger-carrying vehicles; purchase of magazines and books of reference; printing and binding; and traveling expenses of members and employees: *Provided*, That not to exceed ten dollars per diem may be allowed in lieu of subsistence to members and others who serve the Board without compensation.

Enclosure (b)

SEPTEMBER 14, 1944.

THE PRESIDENT, NATIONAL ACADEMY OF SCIENCES,

Washington, D. C.

DEAR SIR: This war emphasizes three facts of supreme importance to national security: (1) Powerful new tactics of defense and offense are developed around new weapons created by scientific and engineering research; (2) the competitive time element in developing those weapons and tactics may be decisive; (3) war is increasingly total war, in which the armed services must be supplemented by active participation of every element of the civilian population.

To insure continued preparedness along farsighted technical lines, the research scientists of the country must be called upon to continue in peacetime some substantial portion of those types of contribution to national security which they have made so effectively during the stress of the present war. By such peacetime service, moreover, there will be maintained at all times a substantial

body of scientists acquainted with military personnel, establishments, procedures, and problems, who can be immediately mobilized for effective service in event of another war emergency. For these purposes, a central organization with adequate funds must be provided.

To provide for continued civilian participation in the longer-term scientific problems of national security when the Office of Scientific Research and Development proceeds to liquidate its activities as a temporary wartime agency, the National Academy of Sciences is hereby requested to establish a Research Board for National Security, the charter of which should be as follows:

ORGANIZATION

1. The Research Board for National Security shall consist of distinguished civilians and high-ranking Army and Navy officers and shall have an executive committee.

2. The Board shall consist of its executive committee and, in addition, of such chiefs of services or divisions of the War Department and of such chiefs of bureaus and offices of the Navy Department as the Secretary of War and the Secretary of Navy, respectively, may designate for appointment by the President of the National Academy of Sciences; and of such civilian scientists, engineers, and industrialists as may be appointed by the President of the National Academy of Sciences acting with the advice of the Chairman of the National Research Council and the Council of the National Academy of Sciences. The civilian members shall be kept as nearly equal in number as practicable to the number of Army and Navy officers on the Board. One of the civilian members shall be the Chairman of the National Advisory Committee for Aeronautics. The total membership of the Board shall not exceed forty. Initial appointments of civilian members shall be for terms of 1, 2, 3, and 4 years, apportioned to achieve continuity, and thereafter appointments shall be for terms of 4 years, except that in case of a vacancy, appointment of a successor shall be for the unexpired portion of the term. Civilian members may be reappointed for subsequent terms, but except in case of a national emergency, continuous membership shall not exceed 2 terms.

3. The Board shall elect annually its Chairman and Vice Chairman from its civilian membership. There shall be an executive committee of five members consisting of the Chairman of the Board, who shall be chairman of the executive committee, an Army officer and a naval officer charged in their respective Departments with the coordination of research, and two civilian members elected annually by the civilian members of the Board.

4. The executive committee, acting under general rules approved by the Board, shall administer and supervise the activities of the Board.

5. It shall be the duty of the Board to formulate programs of scientific research and development relative to problems of national security, to direct and conduct the scientific study of such problems and to advise the Secretary of War and the Secretary of the Navy on the applications of science to national security. Science is here broadly interpreted to include the employment of scientific method of analysis, experiments, and tests in any branch of science or technology, including engineering, medicine, psychology, and biology. Special consideration shall be given to possibilities arising from progress in science and technology. The Board shall, in no way, relieve the Army or Navy or other governmental agencies of their responsibility for, or authority over, research and development work conducted under their legal cognizance.

6. The Board shall submit an annual report to the President of the National Academy of Sciences, with copies to the Secretary of War and the Secretary of the Navy, and at intervals of 3 to 5 years, the Board shall request the President of the National Academy of Sciences to appoint a committee to review the activities of the Board and submit a separate report to the President of the National Academy of Sciences for transmission to the Secretary of War and the Secretary of the Navy.

OPERATIONS

7. The Board shall make use of existing laboratories and facilities, where practicable. The Board shall not operate laboratories under its own auspices.

8. Members of the Board shall serve, as such, without compensation. Members of the Board shall be reimbursed or given allowance for transportation

and subsistence expenses incurred by them in the performance of their duties. Salaries and/or allowances of civilian personnel employed by or otherwise attached to the Board shall be determined by the executive committee of the Board.

9. The Board shall take proper measures to safeguard classified information.

10. Other rules and regulations for the conduct of the work of the Board shall be formulated by the executive committee and approved by the Board.

FUNDS

11. Funds for the Board shall be provided as separate items to be included in the annual War Department and Navy Department appropriation bills. The amounts of these separate items shall be furnished the War and Navy Departments as requirements estimated by the Board.

12. Initial or supplementary funds may be provided for the Board through contract or otherwise with Federal agencies.

Sincerely yours,

HENRY L. STIMSON,
Secretary of War.

JAMES FORRESTAL,
Secretary of the Navy.

NATIONAL ACADEMY OF SCIENCES

OFFICE OF THE PRESIDENT, WASHINGTON, D. C.

NEW YORK, MAY 28, 1945.

Hon. A. J. MAY,
*Chairman, House Committee on Military Affairs,
House of Representatives, Washington, D. C.*

MY DEAR MR. MAY: In compliance with the request you made of me at the time of the hearing on H. R. 2946 last week, I am enclosing herewith an estimate of the amounts of money which may be administered by RBNS during the remainder of this fiscal year and in the fiscal year July 1, 1945-June 30, 1946.

These estimates are in the form of a letter (and attachment) from Mr. Jordan, executive officer of RBNS. You will note that they have the approval of Dr. Compton, Chairman of the Board.

At my request, the estimates are in two parts; viz, (1) Free funds, i. e., money which Congress would be asked to appropriate if H. R. 2946 is enacted and (2) transferred funds, i. e., money transferred by the Army, Navy, or OSRD out of their own research appropriations for long range fundamental research work which they initiate and which RBNS, after examination, feels to be within their province.

The free funds estimated to be needed are for administration and such research work as the Board initiates independently of any specific suggestions from the services. You will note that even for the fiscal year 1946 the amount for research (\$1,500,000) is very small and does not in any way support the fears expressed by some of the members of your committee that H. R. 2946 would authorize a permanent establishment calling for vast sums of money.

Since final contracts with the Army and Navy for this year's support of the Board have not yet been executed, the administrative expenses of the Board (\$15,000) are being advanced by the Academy out of its meager funds.

While I am not in position to know the final decision of RBNS on the projects covered by the proposed transfer of funds for 1946 (\$16,965,000), I have seen the list of projects suggested for transfer and it is my personal opinion that a considerable number of them will not be accepted by the Board. This either because they are thought not to be within the province of the Board or for the reason noted on the summary sheet; viz, unavailability of personnel.

I shall be surprised therefore if the total amount of money required by the Board next year is anywhere nearly as great as the present estimate indicates.

Yours sincerely,

FRANK B. JEWETT, *President.*

RESEARCH BOARD FOR NATIONAL SECURITY,
Washington, D. C., May 25, 1945.

Dr. F. B. JEWETT,
President, National Academy of Sciences,
Washington, D. C.

DEAR DR. JEWETT: In compliance with your request of May 25, 1945, I have prepared the accompanying estimate of funds that might be utilized by the RBNS (1) for that part of the present fiscal year following the beginning of RBNS activities on March 1, 1945, and (2) for the fiscal year 1945-46. These estimates, in accordance with your request, are separated into "free funds" (funds that might be used by the Board in its own operational and administrative costs and to support research projects initiated by itself and not supported by transfer funds from the armed services or other agencies) and "transfer funds" (funds transferred to the Board by Army, Navy, OSRD or other agencies to support research projects).

I have discussed these estimates with Dr. Compton. It is his belief that they are as good estimates as we can make at the present time, with as yet no background of Board operation to serve as a guide.

Very truly yours,

LOUIS JORDAN,
Executive Officer, RBNS.

Estimates of Funds for Research Board for National Security: Operation and research (estimates as of May 24, 1945)

I. For period Mar. 1, to June 30, 1945:

Free funds: Administration-----	\$15,000
Transfer funds:	
From Army-----	\$160,000
From Navy-----	65,000
From OSRD-----	25,000
	<hr/> 250,000
Total-----	<hr/> <hr/> 265,000

II. For fiscal year, July 1, 1945, to June 30, 1946:

Free funds:	
Administration-----	\$450,000
Research-----	1,500,000
	<hr/> \$1,950,000
Transfer funds:	
From Army-----	¹ 12,515,000
From Navy-----	¹ 2,450,000
From OSRD or others-----	2,000,000
	<hr/> 16,965,000
Total-----	<hr/> <hr/> 18,915,000

¹ These figures represent amounts as of the last advice received by the Board, that the Army and Navy have expressed willingness to make available for support of projects they have submitted to the RBNS. Some of these projects, however, have not been critically reviewed and tentatively accepted by the Board. In our judgment scientific personnel would not be available to carry out a program on this scale so long as OSRD remains fully active.

(The committee thereupon adjourned subject to the call of the Chair.)

RESEARCH AND DEVELOPMENT

TUESDAY, MAY 29, 1945

HOUSE OF REPRESENTATIVES,
COMMITTEE ON MILITARY AFFAIRS,
Washington, D. C.

The committee met at 10:30 a. m., Hon. Andrew J. May (chairman) presiding.

The CHAIRMAN. The committee will please be in order.

We are resuming hearings this morning on H. R. 2946, a bill to authorize appropriations for a permanent program of scientific research in the interest of national security.

We have as our first witness this morning Admiral A. H. Van Keuren, director, Naval Research Laboratory, Navy Department.

STATEMENT OF REAR ADM. A. H. VAN KEUREN, UNITED STATES NAVY, DIRECTOR, NAVAL RESEARCH LABORATORY, ANACOSTIA, D. C.

The CHAIRMAN. Admiral, will you come around please, sir, and discuss the bill for us or tell us what you think about it.

Admiral VAN KEUREN. Yes, sir.

The CHAIRMAN. Be very frank, say what you want to say, sir, and we will be glad to hear you.

Admiral VAN KEUREN. I am the director of the Naval Research Laboratory and as such represent the majority views of the civilian scientists and naval staff at that laboratory with whom I have frequently discussed the subject matter of this hearing.

It may be of interest to give a brief history of the laboratory. It was inspired by Thomas A. Edison and the Naval Consulting Board, authorized by Congress in 1916, and opened in 1923. The established mission of the laboratory, as defined by the general board, is to increase the safety, reliability, and efficiency of the fleet by the application of scientific research and laboratory experimentation on naval problems.

At present there are 2,020 civilian scientific, technical, and clerical employees, as well as 918 officers and 1,556 enlisted men and women in the laboratory proper and 2,316 instructors and students in the Radio Matériel School.

I wish to emphasize the fact that the laboratory was founded to be a center of research and experimentation on naval problems, not a mere testing laboratory, and that it was to exert itself on scientific problems irrespective of Bureau having cognizance.

In other words, as its name indicates, a naval research laboratory. It has carried out this concept from the beginning and has served all

bureaus of the Navy Department. It operates under the Chief of the Office of Research and Inventions, which is a part of the Secretary's office. It obtains independent funds from Congress for the maintenance of the laboratory, but its chief support is derived from funds which accompany projects from the various material bureaus. It has divisions concerned with radio, sound, mechanics and electricity, physical optics, chemistry, metallurgy, aircraft-electrical, interior communications, shock, and vibration. It represents an investment of about \$15,000,000. The scientific staff is composed of men with outstanding reputations in their respective fields. The laboratory is proud of its accomplishments, among the most popularized of which are radar and antisubmarine measures, including underwater sound, but it has many other achievements to its credit. Necessarily in war-times it concerns itself with urgent problems of research and development, and I should add, tests, with fundamental research given a secondary place until time permits it to be given more emphasis.

The formation of the Office of Scientific Research and Development and the National Defense Research Committee mobilized the scientific talent of the country which was not already employed at the various Government laboratories.

Without the aid of these outstanding civilian scientists, it would have been impossible to have perfected all the weapons of war which we now have and too much credit cannot be given to the work of these organizations. They have originated many new ideas and weapons of war, and have developed already existing instruments of war such as radar and sonar in many ways needed by the services.

By friendly agreement between civilian scientists and Government laboratories, a division of work has been made in most cases, so that no duplication existed on important projects.

No one in the Navy whom I know will argue against the continuation in some form of the Office of Scientific Research and Development during peacetimes. It is both necessary and desirable, necessary because the Government laboratory facilities and personnel are inadequate for the varied and myriad needs of the Army and Navy in time of war, and desirable because the services need the fresh attack upon scientific problems which is possible from the coordinated efforts of the civilian scientific world, with the aid of institutions of education and industrial laboratories.

The experience of this war has shown that it requires some time for scientists not familiar with military problems to sort them out and devote their talents where most useful to the projects most needed by the services. With an organization such as recommended by the Wilson committee and proposed by this bill, or by the Senate bill, S. 825, there will be continual contact between the military services and the civilian scientific world, so there will be no lost motion when another war begins. But it will be a two-way proposition in that the civilian scientists will keep in touch with military progress and, in turn, will bring to the attention of the military services all the new ideas brought forth in industrial or educational laboratories which have application to military problems. Furthermore, the civilian members of such a research board can keep the country advised of the vital necessity of maintaining research on military matters in times of depression as well as of prosperity, and can bring to bear their expert testimony when important bills regarding national

defense come before Congress. It will take the combined efforts of the military and the civilian scientific worlds to maintain the position that research enjoys today and to convince the public that real money must be expended on research in time of peace to maintain our Military Establishment at a level at least equal technically to that of any nation in the world.

We feel at the Naval Research Laboratory that the Research Board for National Security must have money directly appropriated to it or, which is not so desirable, allocated to it by the Army and Navy. Without funds, the Research Board would become merely an advisory body, unable to keep up the interest of civilian scientists unless they are given projects on which to work and money to finance them.

Dr. Bush in his testimony, and Dr. Jewett in his, made it clear that the function of the Research Board for National Security was not to supplant but to supplement research in Government laboratories. I desire to emphasize that statement because as director of the Navy's largest laboratory I am in close touch with a large number of civilian scientists, and I know that they would lose interest in their work if they felt that another body in time of peace would be given a large share of military research.

Furthermore, their morale would be lowered if, by any chance, the Research Board for National Security should assign the greater part of the most interesting and important fundamental research to civilian laboratories.

The real scientist, and we have many of them in Government service, lives on his reputation with his fellow scientists and reputation is usually founded on his discoveries in fundamental science, something on which he can write a paper and become known to the whole scientific world.

To deprive our Government scientists of an opportunity to undertake some fundamental research would lower their self-esteem and in many cases lead them to sever their service connections.

I wish to endorse the letter which Rear Admiral Furer sent to the editor of the New York Times which was published on May 12, 1945, in which he clarified the erroneous impression in some quarters that the Research Board for National Security under the National Academy of Sciences would control scientific research and development in all branches of the armed services.

In that letter he quoted from the letter of the Secretary of War and the Secretary of the Navy to the president of the National Academy of Sciences, requesting the establishment of a research board for national security, which letter read in part as follows:

* * * The Board shall, in no way, relieve the Army or Navy or other governmental agencies of their responsibility for, or authority over, research and development work conducted under their legal cognizance.

Admiral Furer goes on to state that it should be understood that the Board will have control of additional support in research, and that it would be fatal to discontinue the important work of the Army and naval research establishments or to turn over the control of such work to a board even though the Army and Navy will be well represented on the Board.

In short, the whole sense of Admiral Furer's letter is that the work sponsored by the Research Board for National Security shall supplement and not supplant the work of the Government labora-

fories. In this sentiment I heartily concur and have the unanimous support of the civilian scientists and staff officers at the Naval Research Laboratory.

In my testimony before the Select Committee on Military Policy, I stated that it was immaterial to the Naval Research Laboratory whether the Research Board for National Security was established under the control of the National Academy of Sciences with funds earmarked for them by the Navy or set up as an independent Federal agency, since the same men would probably be on the Board in either case and we deal more with men than with organizations.

Since the date of my testimony, November 24, 1944, I have given the matter further thought and am of the opinion that it would be preferable even now in the early stages of the Research Board for National Security's existence for it to be set up as an independent Federal agency.

The outline of its organization and functions, as recommended by the Wilson committee and quoted in Major General Tompkins' testimony before the Woodrum committee, appears to me to cover the requirements of such a board and this outline comprises the substance of Senate bill S. 825.

If I read the bill correctly, H. R. 2946 establishes a permanent board not an interim board as originally contemplated, with Army and Navy funds for interim operation until such time as another permanent organization could be set up, when it would be necessary to write a new bill.

If a permanent Federal agency were to be set up at this time, the enabling act might require revision at a later date to embrace perhaps additional nonmilitary functions such as Dr. Bush mentioned, but this could be done as simply as writing a new one to replace H. R. 2946.

In other words, a trial period seems to me to be necessary in either case. An independent Federal agency, with flexible personnel, would seem to me to present the advantages of permanency and prestige for the scientific cooperation that the Government must inevitably have, and would simplify the questions of direct responsibility and accountability to Congress, as compared with an agency under the aegis of a corporation.

The CHAIRMAN. Admiral, I have not assumed the position that you do with respect to H. R. 2946 on the question of being temporary legislation.

The testimony here of some of the officials of the National Academy of Sciences went along the line of stating that there was a period of years here, perhaps 2 or 3 years, when they would want to readjust themselves from the present set-up to a new organization.

All this bill does is authorize appropriations for setting up of an agency in the National Academy of Sciences.

What I think the committee will do in the end will be to write a bill establishing an agency but authorizing appropriations to a limited extent for the next fiscal period of 2 years, to enable them to adjust themselves in the temporary situation about which they talk in the testimony.

Now, the thing which I am vitally concerned about is that if you discover secrets in these investigations that the public should not

know about, that we ought to make it possible for civilian scientists engaged in private enterprise in this country to participate in it in such a way that they could be utilized.

In other words, I do not want the Government to put in another bureau if I can avoid it, and we either ought to create your organization and hook the Army into it, or we ought to let the National Academy of Sciences handle it, one or the other.

I do not think this committee is going to set up an independent bureau.

What are your views as to private industry?

Admiral VAN KEUREN. Well, I think it has been shown in this war that it is entirely possible to cooperate with private industry, and they have given us their very best men on military programs, and have worked very closely with the laboratory of which I am director.

I think as I stated in my testimony that it is absolutely necessary for us to continue that cooperative effort in scientific ways.

We need their brains, we do not have all the scientific brains in the Government laboratories; and as I said, they discover in their industrial pursuits in science certain things which can be applied to Army and Navy problems, and they will let us know through the agency of this Research Board when those things are discovered.

I think it is absolutely necessary, Mr. Chairman, to perpetuate this organization.

The CHAIRMAN. Well, there are two ways of doing it. One is to set up an independent agency.

Admiral VAN KEUREN. Yes, sir.

The CHAIRMAN. An additional agency. And the other is to let it come through the National Academy of Sciences, or the two courses of the Army and Navy.

Now, there has been a practice during the war of the Army allocating money and the Navy allocating money; and in the hearing before the Postwar Policy Committee the Committee concluded, as I understand their position, that the National Academy of Sciences, or even an outside independent agency, should not be dependent upon allocations out of appropriations for Navy and military purposes but it should be appropriated directly to whoever is to do that job.

Admiral VAN KEUREN. I agree with that thoroughly. They must have their own funds, and they must be accountable to Congress as to how they spend it.

To be dependent on Army and Navy is bad business, because the Army and Navy may feel that they want to devote their funds to some other purpose.

The CHAIRMAN. And furthermore, it violates the principles of the Appropriations Committee who ought to say what this money is to be used for and who is to handle it.

Admiral VAN KEUREN. Yes, sir.

The CHAIRMAN. All right, Mr. Thomason.

Mr. THOMASON. Would you make those funds subject to audit by the Comptroller General?

Admiral VAN KEUREN. Yes, sir; I would.

Mr. THOMASON. That is all.

The CHAIRMAN. Mr. Brooks.

Mr. BROOKS. I have no questions.

The CHAIRMAN. Mr. Elston.

Mr. ELSTON. Well, what I do not understand is why that money cannot be appropriated to the Army and the Navy but earmarked for this particular use.

The Congress has not been accustomed to making appropriations to private agencies, and after all this is a private corporation.

I am for the objectives too just as much as anybody; I think we would be terribly short-sighted if we did not take full advantage of everything that is defined through this legislation, and otherwise to engage in all types of research and keep up with the rest of the world; but we might be departing into a dangerous field to make appropriations direct to a private organization, and that is exactly what the Academy of Sciences is.

Admiral VAN KEUREN. If I may interrupt a moment, that is why I favor the establishment of an independent agency rather than the one under the Academy of Sciences, where they are making direct appropriations to the independent agency.

It would not have to go through another body, which is the objection to earmarking funds of the Army and Navy.

An intermediate body is always bad; there is always a higher authority to be consulted, and scientists like to have these moneys set up for these projects allocated to them.

It would be subject to review and to auditing. I think that is highly necessary. We do not want any boondoggling going on in the scientific world. I do not think there is any chance of that, because they are the highest-caliber men I know, but I do think there should be accountability.

Mr. ELSTON. Well, I do not think they should have too much freedom of action. They should have freedom of action so far as their own work is concerned, but in the spending of money they should not have too much freedom of action, because they might spend it in the wrong places. They are not businessmen. They are scientists. They might spend the money in the wrong places, whereas, the Army and Navy have been used to things of this kind, they have to come to Congress, they have to explain how they spend money, what they have in mind; and it seems to me a radical departure to give that to an independent agency. We want to get away from independent agencies rather than create more of them. Now, what I am trying to do is this: Do you not think if the money was earmarked by Congress, and the Army comes in and the Navy comes in and they indicate they want so much for this kind of work, let Congress earmark it, let there be some Army and Navy supervision of it; then it would not be recklessly spent. I am afraid this independent agency might begin to get a little control over education too, by having some universities they would make contributions to while others would be excluded. That in itself would not be desirable.

Admiral VAN KEUREN. Well, I think, Mr. Elston, that these scientists will have to select their projects as science advances, and they know the institutions which specialize along certain lines. I think you have to trust them to be fairminded and to put these projects in the places where they can best be accomplished.

Mr. ELSTON: Well, they would not go ahead with any experiment or research work, would they, without first consulting with the Army and Navy?

Admiral VAN KEUREN. Well, in allocating these projects there are representatives on this Board, representatives of the Army and Navy, who would have a powerful voice in saying whether these particular ideas should be pursued and I do not see any possibility of going ahead on something that does not have any promise at all.

Mr. ELSTON. Well, since the Army and Navy will indicate what they want them to go ahead with, it seems to me they could indicate the money and how it should be spent.

These scientists might wander off into a lot of fields. Virtually everything could be labeled national defense, public health and everything else.

Admiral VAN KEUREN. Public health is part of national defense. This war has shown that the number of physical eligibles for the Army as you well know, is deplorably small, the percentage, and, building up of public health is a way of fostering national security.

I do not advocate that immediately, I think we should primarily devote ourselves to weapons of war.

Mr. ELSTON. I agree with you on that too, and my fear is that they might get into other fields and get beyond what is intended.

That is why I think the Army and Navy should supervise it.

The CHAIRMAN. For military purposes.

Mr. ELSTON. Yes. I think the Army and Navy know about those things, I think the scientists can go out and do a wonderful job, but after all, the Army and Navy have to tell them what they want.

Admiral VAN KEUREN. Well, one of the objectives in setting up this other board, which is really controlled by senior scientists with the advice of the Army and Navy, is to go into fields which the Army and Navy might not think of, and too much control by the Army and Navy I think would be undesirable.

These scientists like to exercise their imagination and go off into new fields.

It can be checked by the Army and Navy representatives, but to tie them down to projects which will be assigned to them by the Army and Navy I think is bad.

Mr. ELSTON. Well, it is obvious that they do not want to be checked too much, because they had an original paragraph in here that no funds should be subject to review or accounting by the Army and Navy or anybody else.

Admiral VAN KEUREN. Well, I understand that paragraph has been removed.

Mr. ELSTON. That is right; but that was the idea in the beginning.

If they have any such ideas as that, and if they tried to go too far afield, they might be wasting the taxpayers' money.

The CHAIRMAN. Mr. Kilday.

Mr. KILDAY. Admiral, I understood you to say in your opening paragraph that you represent the majority views of the civilian scientists and naval staff at the laboratory, and in your last paragraph you indicate an independent agency rather than the agency set up under the Academy of Sciences.

Admiral VAN KEUREN. That is correct.

Mr. KILDAY. Am I to understand from your statement in the first paragraph that this is the view of your staff at the laboratory rather than the Navy Department?

Admiral VAN KEUREN. Yes, sir. I am speaking for the Laboratory there.

Mr. KILDAY. And this is the view of your staff?

Admiral VAN KEUREN. The majority view. There are some that take the other viewpoint, but this is decidedly the majority view.

Mr. KILDAY. I do not believe we have had the Navy Department's position on it.

Admiral VAN KEUREN. No, sir. Admiral Bowen is to present that.

Mr. KILDAY. But you feel that it would be better going through this corporation that was set up many years ago?

Admiral VAN KEUREN. Yes, sir.

Mr. KILDAY. Have them make the allocations and so on, have them add an independent Federal agency but still preserve the economy of your laboratory set-up in accordance with the recommendation made some time ago by Thomas A. Edison?

Admiral VAN KEUREN. Yes, sir.

The CHAIRMAN. Mr. Davis.

Mr. DAVIS. I have nothing.

The CHAIRMAN. Mr. Fenton.

Mr. FENTON. The laboratory did considerable experimenting in the prewar period, I take it.

Admiral VAN KEUREN. Yes, sir.

Mr. FENTON. What would be the difference between that period and the postwar period as a matter of authority to operate the laboratory?

Admiral VAN KEUREN. What would be the difference in the prewar period and the postwar period?

Mr. FENTON. Yes.

Admiral VAN KEUREN. We will continue to perfect the ideas which come out of this war, and to originate new ideas along the line suggested by fundamental research.

It has been my policy, and that of all my predecessors, including Admiral Bowen, to devote a considerable percentage of our effort to fundamental research, in the hope that we can find some new principle which will lead to a new weapon of war.

We have to keep up that work to maintain the interest of our scientists.

But there is a constant flow of requests from the Commander in Chief and from all matériel bureaus for perfecting things that we already have, the principles of which we already have, and the war naturally brings about demands for countermeasures to the weapons which have been devised by our enemies.

So there is no end of problems. We can tackle only the highest priority problems, which will last for years.

Mr. FENTON. In the prewar period, Admiral, were you ever hampered by lack of funds?

Admiral VAN KEUREN. I was not there, but I have looked into that history, and they were hampered.

And as I stated before the Woodrum committee, sometimes that was our own fault.

We did not appreciate the fact that we should make more intensive effort on getting up new weapons of war.

But we had some weapons of war that were originated at the laboratory where the development was actually held back by lack of funds,

and it was not the fault of Congress, because Congress came through every time we asked them to give us funds, but a general lack of interest, I would say.

Congress even one year gave us money which was not directly asked for, because they became interested in the problem of radar.

The CHAIRMAN. Anything further?

Mr. FENTON. No.

The CHAIRMAN. Mr. Brooks.

Mr. BROOKS. Admiral, I want to ask you one or two questions, and in the asking I do not want to be misunderstood.

The Germans had some sort of method of pursuing scientific discoveries, inventions.

Do you know anything about the methods which they pursued, the German scientists?

Admiral VAN KEUREN. I do not know as much as I would like to, Mr. Brooks, and we have a great many officers and scientists over there now delving into that very question, and they have been successful in getting hold of some of the German scientists, so we will know more about it. But they undoubtedly mobilized every scientist of any ability at all for this effort.

We heard that earlier in the war that they did not save the younger scientific workers and they allowed them to go into the army, but after the Battle of Britain they hauled them all back and put them to work in the laboratories.

Mr. BROOKS. Were they handled in the War Department, the Navy Department, or did they have something similar to the Academy of Sciences?

Admiral VAN KEUREN. That I cannot answer, Mr. Brooks. We will know more about that very shortly.

Mr. BROOKS. That is all.

The CHAIRMAN. Mr. Short.

Mr. SHORT. No questions.

The CHAIRMAN. Thank you very much. Your statement is very enlightening and helpful to the committee.

Admiral VAN KEUREN. Thank you.

The CHAIRMAN. The next witness is Admiral H. G. Bowen, Director, Office of Patents and Inventions, Navy Department.

STATEMENT OF ADMIRAL H. G. BOWEN, DIRECTOR, OFFICE OF PATENTS AND INVENTIONS, NAVY DEPARTMENT

The CHAIRMAN. Have you a written statement?

Admiral BOWEN. No, sir.

I have, Mr. Chairman, a letter—copy of a letter—from the Secretary of the Navy to the chairman of this committee on this bill which I would like to read.

The CHAIRMAN. All right.

Admiral BOWEN (reading):

HON. ANDREW J. MAY,

*Chairman of the Committee on Military Affairs,
House of Representatives.*

MY DEAR MR. CHAIRMAN. The bill H. R. 2946, authorizing appropriations for a permanent program of scientific research in the interest of national security,

was referred by your committee to the Navy Department with request for a report thereon.

The purpose of the proposed legislation is to provide for a permanent program of scientific research in the interest of national security.

It is manifest that the future security of the United States makes it imperative that we retain our present position in the vanguard of scientific research. Our present experience as to the profound effect of science upon the weapons and conduct of military operations is indicative of the grave danger to which we shall be exposed if we fall behind in future scientific developments which will make our present splendid military and naval equipment obsolete. For this reason, it is strongly urged that legislation having the general objective of the bill H. R. 2946 be speedily enacted.

In considering the particular methods of achieving the purposes of the legislation it is suggested, however, that instead of providing for grants to a non-governmental agency, such as is proposed by the bill, a Federal Research Board for National Security should be established.

This question has been very carefully considered by the Committee on Postwar Military Research, which made its report to the Secretary of War and the Secretary of the Navy on September 14, 1944. Since that date the Secretaries of War and Navy have already taken the initial interim steps proposed pending the enactment of legislation recommended in the report.

The legislation recommended in the report would establish a permanent Federal agency which would utilize the services of the outstanding scientists of the Nation in the planning and execution of military research. The agency would include representatives of the Army and Navy, the Chairman of the National Advisory Committee for Aeronautics, and civilian scientists, engineers, or industrialists approximately equal to the military representatives. The Chairman and Vice Chairman would be civilians. The Chairman, with the approval of an executive committee, would execute contracts for the conduct of scientific research.

It is recommended that the bill H. R. 2946 be so amended that provisions along the lines above indicated—which might be the provisions of the bill S. 825—would be substituted for its present provisions. The Navy Department strongly recommends enactment of the bill H. R. 2946 if so amended.

The Navy Department has been informally advised by the Bureau of the Budget that there would be no objection to the submission of the above report, but that such report is not to be considered as a commitment as to the relation of the legislation to the program of the President.

Sincerely yours,

H. STRUVE HENSEL,
Acting Secretary of the Navy.

The CHAIRMAN. All right; thank you, Admiral. Have you any further statement you would like to make?

Admiral BOWEN. No, sir.

The CHAIRMAN. The committee is in recess subject to call.

(Whereupon, at 11:20 a. m., the committee recessed, subject to the call of the Chair.)

(The following letter was submitted for the record:)

RESEARCH BOARD FOR NATIONAL SECURITY,
Washington, D. C., May 25, 1945.

The Honorable ANDREW J. MAY,
*Chairman, Military Affairs Committee,
House of Representatives, Washington, D. C.*

MY DEAR MR. MAY: On my return from a trip yesterday I learned about the hearings which were held on H. R. 2946, and I understand that Dr. Jewett is furnishing your committee with certain information regarding prospective requirements for funds for the coming year.

Being naturally very much interested in the possibility of really useful functioning of this board I take the liberty of submitting the following personal comments which have to do principally with the matter of timing and with my personal estimate of the amount of funds which the board ought to have available. Please feel free to consider this as either a personal memorandum to you or a statement for your committee, whichever to you may seem to be most appropriate.

It is impossible to make more than a reasonably intelligent guess concerning

the funds required by RBNS in the coming year because of uncertainty in the progress of the Japanese war and hence the extent to which OSRD and other agencies should continue to command the funds, research personnel, and facilities available in civilian organizations. Furthermore, we have yet no background of experience as to extent of availability of personnel for postwar research on national security problems. We do, however, have on hand a very impressive initial program of fundamental research projects of type appropriate for this board. The uncertainties are, therefore, in timing and not in the basic importance and promise of the work.

In spite of this uncertainty of timing, it is of great importance to put the RBNS in a position to do business. As you know, Dr. Bush, for OSRD has told the Appropriations Committee that he is driving toward June 30, 1946, as his best present guess as to the date after which research in the laboratory stage will no longer be significant in winning the Japanese war. Consequently, all the activities in new weapon development in OSRD are now being reorganized for completion on or before this date, or for transfer of such parts as should be continued to the appropriate permanent agency.

Certain activities in OSRD, which were undertaken for use in this war, are also of longer term significance, and should be continued. In fact, some of these things should be the most important initial projects of the new RBNS. But unless RBNS is quickly put in a position to give assurance of its ability to take over these jobs, OSRD can only plan to liquidate them. The scientific personnel would then be dispersed to other employment and the scientific equipment would be disposed of as surplus property or otherwise. Any attempt then to get the work going again would be far less effective and would cost the Government far more than if the transition could have been handled in a planned and orderly fashion.

As you know, a Presidential directive has cut off from RBNS the funds which the Army and Navy had expected to make available to RBNS in this initial year. I hope that this can be again opened up. Certainly some way should be found to break the present impasse, or the opportunity to start off on an efficient and orderly basis, synchronized with the liquidation of OSRD, will have been lost.

As to the amount of funds, I still think the Wilson committee's original estimate was good; that is, not less than \$5,000,000 nor more than \$20,000,000 per year.

As to the next fiscal year, I personally doubt if we could wisely spend more than \$10,000,000 from all sources (transfers from Army, Navy, OSRD, and others), and probably not that much. This is because I think OSRD will still require the great bulk of research talent for this war, and because I think industries and universities must get some of their research men back on peacetime jobs when these men can be released from emergency war work.

These are my personal opinions, not an official RBNS opinion, since the Board as such has not yet tried to make its own estimates.

Sincerely yours,

KARL T. COMPTON, *Chairman, RBNS.*

×

