

## MISSILE DEVELOPMENT AND SPACE SCIENCES

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HOUSE OF REPRESENTATIVES,  
COMMITTEE ON SCIENCE AND ASTRONAUTICS,  
*Washington, D.C., Tuesday, February 17, 1959.*

The committee met at 10 a.m., in the caucus room, Old House Office Building, Hon. Overton Brooks, chairman, presiding.

The CHAIRMAN. The committee will please come to order. Mr. Ducander, will you tabulate the roll as the members come in. It has been our policy always to keep a record of those in attendance but to give everybody time to get in before calling the roll.

This morning we have what I think is an historic session. We have as witnesses Dr. Herbert F. York, Director of Defense Research and Engineering, of the Department of Defense, Mr. Roy Johnson, Director of ARPA, and Mr. William M. Holaday, Director of the Office of Guided Missiles, Department of Defense, Chairman of the Civilian-Military Liaison Committee, NASA. All of these witnesses are in, I should say, critical positions. They are in positions of authority which can be especially helpful to our program, so I am glad that we have all of them here this morning.

Now all of them have prepared statements. I have read these prepared statements. We have sent copies to all of the members of the committee yesterday and my thought is that this morning we would proceed first to let them all present their prepared statements. One statement complements the other statement and after letting them all proceed with their prepared statement, we can then ask them questions on their own statement or any other statement presented this morning. If there is no objection to that procedure, we will do that.

We will ask Dr. York as the first witness to proceed with his prepared statement.

### **STATEMENT OF DR. HERBERT F. YORK, DIRECTOR, DEFENSE RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE**

Dr. YORK. Mr. Chairman and members of the committee; I welcome this opportunity to appear before you and to present a brief statement concerning the new Office of Director of Defense Research and Engineering. I want to say at the outset that it is highly gratifying to note that this committee is not only deeply concerned with how we are doing in our space programs but is equally concerned with the advancement of science on all fronts. In my new job I find that the Department of Defense is indeed involved in science and engineering across the board.

Since Mr. Holaday and Mr. Johnson are also here this morning and will follow me, I will not go into any detail with respect to the programs of their respective offices. However, I do want to present an

**explanation of the authority and responsibility of my office and its relationship to other DOD agencies.**

The basic concept of the new position of Director of Defense Research and Engineering was set forth by the President in his message to the Congress that accompanied his defense reorganization proposal of last year. He said that the new position would replace that of the Assistant Secretary of Defense, Research and Engineering, that the Director would rank immediately after the service Secretaries, and that he would have three principal functions: (1) be the principal adviser to the Secretary of Defense on scientific and technical matters; **(2) supervise all research and engineering activities in the Department of Defense, including those of the Advanced Research Projects Agency and of the Office of the Director of Guided Missiles; and (3) direct research and engineering activities that require centralized management.**

I believe the relationship of my Office to other Department of Defense agencies is best understood when viewed in the following context. There are four basic operating agencies in the Department of Defense—Army, Navy, Air Force, and the Advanced Research Projects Agency. These agencies all do research and engineering either “in house” or by contract with outside sources. The function of my Office is to supervise and coordinate all research and engineering regardless of what agency undertakes the task or the nature of the task undertaken.

A fuller explanation of the relationship of my Office and the Advanced Research Projects Agency and the Office of the Director of Guided Missiles was made by Secretary McElroy before the House Armed Services Committee earlier this month. He said that—

**the Director of Defense Research and Engineering will supervise and coordinate all Department of Defense research and engineering programs. He will be responsible for providing effective leadership, eliminating unnecessary duplication, encouraging basic research, and developing an integrated research and development program covering all operational needs.**

We plan to continue the Advanced Research Projects Agency. It will be an operating Agency paralleling the research and engineering organizations of the military departments. The Director of this Agency will report to me administratively. However, his research programs will be subject to the supervision and coordination of Dr. York's Office just as are those of the military departments.

Mr. Holaday's job as Director of Guided Missiles has had two quite different aspects. One has been to monitor and supervise all research and engineering work in the field of guided missiles; the other has been to assure appropriate priority handling of all guided missile problems in connection with their transition from the research, engineering, and testing stage into production and procurement. The research and engineering responsibilities of the Director of Guided Missiles together with the personnel involved will be transferred shortly to the Director of Defense Research and Engineering.

I might interpolate some of them are being transferred, I believe, today. We will proceed with deliberate caution with respect to the priority and production responsibilities in order not to lose any of the momentum the program has developed. Therefore, for a time at least, Mr. Holaday will remain as a Special Assistant to me with the assignment to continue to handle those special aspects of the program which are beyond the research, engineering, and testing phase.

Further, I have made available to you and your staff a DOD directive issued by Secretary McElroy on February 10 which spells out my authority and responsibility. I call your particular attention to page 4, section V. A 2, Authorities, which reads:

Approve, modify, or disapprove programs and projects of the military departments and other Department of Defense agencies in his assigned fields to eliminate unpromising or unnecessarily duplicative programs, and initiate or support promising ones for research and development.

I believe this section is self-explanatory and should remove any confusion as to my authority. However, I don't intend to use this authority as a club but rather, I expect to function as a staff officer to the Secretary of Defense and to develop the very closest and harmonious working relationship with the military departments. Because of my close past association with Mr. Holaday and Mr. Johnson, there already exists this harmonious working relationship. It is fair to say that an excellent start has also been made with the people in the military departments in developing what I believe is the necessary rapport for effective results.

Next, I would like to cover the current funding situation as it applies to DOD programs for research, development, test, and evaluation. For a number of years the research and engineering appropriations have not included all of the funds which support the program. Construction at research and engineering establishments has been paid from military construction appropriations, major procurement costs for test and evaluation have been paid from procurement and production appropriations, and military personnel costs for such personnel engaged in research and development work have been paid from military personnel appropriations.

This year the budget structure has been realigned to include a considerable amount of the test and evaluation procurement in the research and engineering appropriations. The related construction and military personnel costs remain in the separate appropriations. However, my office takes a very active part in the review and final determination of the amounts that will be included for these purposes, specifically in the military construction area. In the fiscal year 1960 military construction program, for example, there were more than 180 R. & D. type facility items totaling close to \$200 million that were considered in the review that was accomplished as a joint effort between my office and the Office of the Assistant Secretary of Defense, Properties and Installations. The expanded research and engineering appropriations, which have been labeled "Research, Development, Test, and Evaluation" in the fiscal year 1960 budget, now total \$3.772 billion. It is difficult to determine the comparable figures for previous years, but there are estimated to be \$2.258 billion in fiscal year 1958 and \$3.464 billion in fiscal year 1959. In addition to these funds, there are items separately identified as supporting research and development but still remaining in the procurement appropriations. This total support from all appropriations has increased considerably in recent years primarily because of the very expensive weapons systems included.

The new obligational authority, planned obligations, and planned expenditures for fiscal years 1958, 1959, and 1960 are as follows:

[In millions of dollars]

	New obligational authority	Obligations	Expenditures
Fiscal year 1958.....	2,258	2,503	2,034
Fiscal year 1959.....	3,464	3,522	3,020
Fiscal year 1960.....	3,772	3,722	3,384

Within the new research, development, test, and evaluation appropriation there are eight major activity classifications. Excluding the emergency fund of \$150 million, these categories and the fiscal year 1960 funds requested for each are—

Military sciences, \$364.1 million;

Aircraft and related equipment, \$497.3 million;

Missiles and related equipment, \$1,410.8 million;

Military astronautics and related equipment, \$309.1 million;

Ships and small craft and related equipment, \$161.6 million;

Ordnance, combat vehicles and related equipment, \$229.0 million;

Other equipment, \$441.0 million;

Programwide management and support, \$209.3 million.

This adds to a very considerable program of research and engineering for military purposes with enough diversification and depth to meet with force the demands of rapidly changing world conditions. A nonaggressive nation never knows where it may have to fight, since it cannot choose the time nor place of attack. If the future follows the pattern of the past, there may be more limited wars along with the ever-present threat of massive attack. For these reasons we must be prepared for any type of enemy action wherever it may occur. We feel that the program as presently conceived provides the proper balance at this time. Should conditions change substantially, as may be expected in a program as dynamic as research and engineering, we will make appropriate changes and recommendations to assure the Congress and the American people that our military research and engineering programs will fully support present and future operational needs.

This concludes my prepared statement. I shall be pleased to attempt to answer any questions that you may have.

The CHAIRMAN. Thank you, Doctor. At this point it has been suggested that we place in the record a copy of the original directive of February 10, 1959, from the Department of Defense to which Dr. York has referred. If there is no objection, we will ask that the entire directive be placed at this point in the record.

(The document referred to is as follows:)

February 10, 1959  
Number 5129.1  
AdmAsst., S/D

DEPARTMENT OF DEFENSE DIRECTIVE

Subject: Director of Defense Research and Engineering

I. GENERAL

Pursuant to the authority vested in the Secretary of Defense and the provisions of the National Security Act of 1947, as amended, including the Department of

Defense Reorganization Act of 1958, the Director of Defense Research and Engineering shall have responsibilities, functions, and authorities as prescribed herein.

## II. RESPONSIBILITIES

The Director of Defense Research and Engineering is the principal adviser and staff assistant to the Secretary of Defense in the following functional fields:

1. Scientific and technical matters
2. Basic and applied research
3. Research, development, test, and evaluation of weapons, weapons systems, and Defense materiel
4. Design and engineering for suitability, producibility, reliability, maintainability, and materials conservation.

## III. FUNCTIONS

Under the direction, authority, and control of the Secretary of Defense, the Director of Defense Research and Engineering shall supervise all research and engineering activities in the Department of Defense and shall perform the following functions in his assigned fields of responsibility:

1. Recommend policies and guidance governing Department of Defense planning and program development.
2. Plan and recommend an optimum integrated program of research and development to meet the requirements of national military objectives and initiate projects to fill important gaps which may exist.
3. Review projects, programs, and objectives of programs of the military departments and other Department of Defense research and development agencies.
4. Develop systems and standards for the administration and management of approved plans and programs.
5. Evaluate the administration and management of approved policies, programs, and projects.
6. Recommend the assignment or reassignment of research and engineering responsibility for the development of new weapons or weapons systems, giving due consideration to the departmental functions set forth in DOD Directive 5100.1.
7. Direct and control (including their assignment or reassignment) research and engineering activities that the Secretary of Defense deems to require centralized management.
8. As approved by proper authority, engage in or designate appropriate research and development facilities to engage in basic and applied research projects essential to the responsibilities of the Department of Defense which pertain to weapons systems and other military requirements: (1) by contract with private business entities, educational or research institutions or other agencies of government, (2) through one or more of the military departments, or (3) by utilizing employees and consultants of the Department of Defense.
9. Recommend appropriate steps (including the transfer, reassignment, abolition, and consolidation of functions) which will provide in the Department of Defense for more effective, efficient, and economical administration and operation, will eliminate unnecessary duplication, or will contribute to improved military preparedness.
10. Recommend to the Secretary of Defense appropriate funding for research, development, test and evaluation, including allocations from the Emergency Fund, Department of Defense.
11. Keep the Department of Defense informed on significant trends in scientific research relating to national security and recommend measures to assure continuing progress.
12. Exercise administrative direction of the Weapons Systems Evaluation Group and assure its responsiveness to the needs of the Joint Chiefs of Staff and the Office of the Secretary of Defense for operations analysis.
13. In coordination with the Assistant Secretary of Defense (International Security Affairs), engage in programs for assistance to friendly countries in

military research and development and in the interchange of related scientific and technical information.

14. Such other duties as the Secretary of Defense assigns.

#### IV. RELATIONSHIPS

A. In the performance of his functions, the Director of Defense Research and Engineering shall—

1. Coordinate actions as appropriate, with the military departments and other Department of Defense agencies having collateral or related functions in the field of his assigned responsibility.

2. Maintain active liaison for the exchange of information and advice with the military departments and other Department of Defense agencies.

3. Consult with the Joint Chiefs of Staff on the interaction of research and development and strategy.

4. Seek formal statements of military operational requirements from the military departments or the Joint Chiefs of Staff, as appropriate, for research and development projects and equipment areas which appear to require such statements.

5. Maintain or arrange for the maintenance of active liaison with appropriate research and development agencies outside the Department of Defense, including private business entities, educational or research institutions or other agencies of government.

6. Make full use of established facilities in the Office of the Secretary of Defense, military departments and other Department of Defense agencies rather than unnecessarily duplicating such facilities.

B. The Secretaries of the military departments, their civilian assistants, and the military personnel in such departments shall fully cooperate with the Director of Defense Research and Engineering and his staff in a continuous effort to achieve efficient administration of the Department of Defense and to carry out effectively the direction, authority and control of the Secretary of Defense.

#### V. AUTHORITIES

A. The Director of Defense Research and Engineering, in the course of exercising full staff functions in his assigned fields, including those enumerated in Section III above, is hereby specifically delegated authority to—

1. Issue instructions and one-time directive-type memoranda, in writing, appropriate to carrying out policies approved by the Secretary of Defense for his assigned fields of responsibilities in accordance with DOD Directive 5025.1. Such instructions and memoranda to the military departments will be issued through the Secretaries of those departments or their designees.

2. Approve, modify or disapprove programs and projects of the military departments and other Department of Defense agencies in his assigned fields to eliminate unpromising or unnecessarily duplicative programs, and initiate or support promising ones for research and development.

3. Obtain such reports and information (in accordance with provisions of DOD Directives 7700.1 and 5158.1) and assistance from the military departments and other Department of Defense agencies as may be necessary to the performance of his assigned functions.

B. Other authorities specifically delegated by the Secretary of Defense to the Director of Defense Research and Engineering in other directives will be referenced in an inclosure to this directive.

#### VI. ABOLITION AND TRANSFER

A. The position of Assistant Secretary of Defense (Research and Engineering) is hereby abolished and all personnel, functions (including the administrative direction of the Weapons Systems Evaluation Group) and records of the Office of the Assistant Secretary of Defense (Research and Engineering) are transferred to the Office of the Director of Defense Research and Engineering as of the effective date of this directive.

B. All directives, instructions, memoranda, delegations of authority, or other issuance not canceled by this directive containing the title of Assistant Secretary of Defense (Research and Engineering) are hereby changed to Director of Defense Research and Engineering.

## VII. CANCELLATION

DOD Directive 5129.1, dated March 18, 1957, is hereby canceled.

## VIII. EFFECTIVE DATE

This directive is effective upon publication.

NEIL McELROY,  
*Secretary of Defense.*

Inclosure—1.

Feb. 10, 1959  
5129.1 (Incl. 1)

REFERENCE TO OTHER AUTHORITIES SPECIFICALLY DELEGATED BY THE SECRETARY  
OF DEFENSE RESEARCH AND ENGINEERING IN OTHER DIRECTIVES

1. Authority to act for the Secretary of Defense in matters pursuant to Executive Order 9913, pertaining to the termination of OSRD as contained in DOD Directive 5128.6, dated 9 August 1954.

The CHAIRMAN. Next we have the statement of Mr. Johnson or Mr. Holaday. Who prefers to come next? Mr. Roy Johnson, Director of ARPA. There are three chairs there, gentlemen, and you may sit up here and hear what is said, and then you will be able to answer the questions more readily.

Mr. Roy Johnson, Director, Advanced Research Projects Agency, ARPA. Mr. Johnson.

STATEMENT OF ROY W. JOHNSON, DIRECTOR, ADVANCED RE-  
SEARCH PROJECTS AGENCY, DEPARTMENT OF DEFENSE

Mr. JOHNSON. I welcome this opportunity to appear before you to discuss the U.S. military space program, a program for which I have been assigned responsibility. We must have a strong and versatile military space program to insure that the United States achieves and maintains a superior capability to operate in space in defense of the Nation and the free world.

This is true simply because of the totality of the threat. Our security problem is not similar to that of the potential aggressor insofar as military space systems are concerned. The aggressor does not have to resort to complicated and expensive space activities to achieve early warning against surprise attack. We must have that alarm bell. The aggressor does not require the diversified strategic retaliatory posture as a deterrent to general war that we must have.

The Advanced Research Projects Agency has mobilized the great capability of the Department of Defense under the discipline, priority, and long-range planning necessary to provide the breakthroughs of space leadership. On the day ARPA was created, February 7 of last year, we began to study ideas and proposals to provide, not a fractional, but an order of magnitude propulsion jump. On August 15, 1958, ARPA issued instructions initiating the development of a 1½-million-thrust booster, utilizing clustered ballistic-missile-type engines. This booster is to be flight tested in the fall of 1960, which is about 2 years after initiation of the program. The clustered booster principle gained more than 3 years over other approaches to obtain this thrust level and at about half of the cost. The program is being pursued vigorously at the present time.

On August 29, 1958, ARPA initiated a program to develop a new high-energy, upper stage which will have utility in this and other programs. This high-energy, upper stage is to be available in time to be mated with the 1½-million-pound-thrust cluster. These two developments will provide the new building blocks necessary to place 35,000 pounds of useful payload into a nominal 300-nautical-mile orbit. This is the kind of weight launch capability that I think the United States has to have within the next 2 or 3 years.

In addition, as part of the long-range propulsion plan, on April 17, 1958, ARPA requested the Air Force to proceed with the development of a million-pound-thrust, single-chamber engine. ARPA considered that this engine would be available for use within about 5 years. ARPA presently views this basic building block, which is now under the auspices of the NASA, as our means for attaining thrust range of between 6 to 12 million pounds by clustering. Such a basic booster, with appropriate upper stages, will allow us to place between 200,000 and 400,000 pounds into a nominal 300-nautical-mile orbit or will give us the necessary propulsion to operate maneuverable space vehicles in defense of the free world.

Thus, the NASA and ARPA now have under development two great propulsion jumps. The first is from our Atlas booster capability of 350,000 pounds of thrust to a capability of 1½ million pounds of thrust.

The second propulsion jump is from the 1½-million-pound-thrust capability to a 6- to 12-million-pound-thrust capability.

This is the propulsion side of the story. We must also learn how to so guide and control a manned space vehicle that it can maneuver on an extended basis throughout vast regions of outer space in protection of an earth which will be growing as small as to become indefensible without such versatile vehicles.

This involves considerable knowledge we do not now have. However, were we not to plan for such eventualities, we should be considered ostrich-like.

As a beginning, we are now initiating the Discoverer program to learn how to return a satellite from orbit. Space satellite launches under the discoverer program are now in final preparation. The launch vehicle utilizes a modified Thor as the first stage and a new rocket called the Bell-Hustler as the second stage. This combination can launch satellites weighing approximately 1,300 pounds, including the weight of the second-stage vehicle, which will orbit as an integral part of the satellite. The initial launching primarily will be to test the vehicle itself, especially its propulsion and guidance. Later the satellite will contain biomedical experiments to seek data on environmental conditions, and recovery of these experiments will be undertaken. Both through this Discoverer project and by direct means, we are supporting the NASA project Mercury for development of manned recoverable space vehicles.

Beyond these programs, the Department of Defense is pursuing actively what we call "Mrs. V," our short name for a truly maneuverable and recoverable space vehicle.

Here, our program includes developments relating to Dyna-Soar, an advanced boost glide system, with application to the more sophisticated maneuverable vehicles being considered by ARPA. We see



an urgent requirement to move from the area of controlled orbits to the area in which space vehicles maneuver in and out of orbit and develop space flight performance similar to that currently enjoyed by manned aircraft in the atmosphere. During the coming year ARPA will sponsor work leading to advanced maneuverable vehicles, and it would appear that we shall be able to achieve many of our preliminary objectives in this field within the next 5 to 10 years.

While the NASA and ARPA program planning is logically aimed at the development of breakthrough technology necessary to stationing of such manned vehicles in space as may be required, we are proceeding rapidly with shorter term defense applications derived from our new-found capabilities for orbiting objects in space. ARPA has initiated programs in the fields of communications satellites, navigation satellites, cloud cover satellites, and early-warning satellites. In addition, it has assumed management control over the Sentry project, formerly known as WS-117L.

The research and development program for a communications satellite system is of 5 to 6 years' duration. This program was initiated by Project Score on December 18, 1958, when an Atlas launch vehicle placed a relatively simple delayed-repeater system into satellite orbit. ARPA orders have been issued for development of a highly sophisticated version of this system. Test of the new system will begin with satellite launches in a year or so. The satellites will be launched by IRBM-type boosters into 300 to 500-mile orbits. The system itself will have a communications capacity equivalent to 20 continuously available 100-words-per-minute teletype channels.

The Courier delayed-repeater phase of the communications satellite program will lead to relief of intercontinental electrical communications systems by handling vast amounts of routine traffic, thus freeing surface communications for top priority messages.

The later phase of the communications satellite program is the orbit repeater system. This phase will provide satellites capable of receiving and retransmitting messages on an instantaneous basis from 3,000 to 22,300-mile orbits. An ICBM-type booster will be employed to develop a capability to launch the instantaneous repeater payload into a stabilized 24-hour orbit at a 22,300-mile altitude. At this altitude, the satellite will complete 1 revolution around the earth every 24 hours, hence its characteristic of maintaining position over a given point on the globe when launched equatorially.

The instantaneous repeater will involve communications equipment of greater sophistication and capacity than that to be used in the courier delayed-repeater system. Most importantly, the instantaneous repeater system will provide intercontinental point-to-point communications, ground-to-air and ship-to-shore communications, and broadcast-type communications to ground and mobile units on an instantaneous basis. Optimum performance in receiving and retransmitting messages will be obtained by using 3 or 4 satellites equally spaced around the equator at 22,300 miles. The rapidity, reliability, and security of the point-to-point communications resulting from this satellite system represent breakthrough technology in terms of present military communications capabilities.

Our defense interests also dictate that we develop navigational systems employing satellites. Because vast areas of the world and its

oceans are inadequately plotted, a more accurate, all-weather, space-based navigational system will be an essential component of worldwide military movements and operations of many types. In using satellites for navigation, we are really taking advantage of the satellite's similarity to the stars, which, as you know, have for a long time been important to navigational systems. The important navigational difference, however, is that a satellite can be fitted out with a radio source which can be heard and detected by any ship, airplane, or other object on the surface of the earth, at any time of day or night, and in good or bad weather. This will be of particular value to guidance of aircraft, surface ships, submarines, and space craft. Under our present program, we will begin satellite tests in mid-1959 and would hope to have initial systems in operation within the next few years.

Another of our space activities is the tactical cloud cover program. It is planned that this program will provide an answer to the present difficulties resulting from the lack of immediate weather information in inaccessible areas. Reliable weather information, especially cloud and surface wind conditions, is urgently needed. The satellite, by virtue of its ability to transmit rapidly over a large portion of the earth's surface, provides a potential answer to present difficulties resulting from lack of weather information. Under the program now underway in ARPA, the first launching will be attempted in mid-1959. Naturally, such satellites have important implications to scientific as well as defense interests, and this program will be transferred to NASA on July 1, 1959.

With the decrease in warning time brought about by the intercontinental ballistic missile, the Advanced Research Projects Agency is directing Project Midas, a program to develop an early warning system based on use of satellites.

ARPA became responsible for the Sentry program in June of 1958. In order to provide timely military information vital to defense planning, an orbiting satellite system has important ramifications.

It should be evident that we are rapidly approaching a time when the space population will consist of many radiating as well as non-radiating satellites in orbit. This Nation must have the capability to track all types of satellites and space vehicles. Furthermore, the long-range space program depends upon an adequate tracking and data acquisition network. Without an adequate tracking environment, the orbiting of experimental military satellite systems is, for all practical purposes, meaningless.

It is realized that such a system could become very expensive, and therefore careful coordination of the requirements of all potential users of such a network is required. During the past year, ARPA, with the assistance of the Jet Propulsion Laboratory, and since its foundation, NASA, has studied needs for worldwide space surveillance systems with a view to providing an overall program without unnecessary duplication. This work has recently culminated in a signed agreement between NASA and the Department of Defense for a general-purpose national system.

In essence, the agreement provides for four additional tracking and data acquisition stations for deep space probes and broad-band data readout to be located at separate oversea installations; two of these stations will be operated by NASA at the outset, and two by

Defense. Exchange of common data is provided in the agreement. The agreement also provides facilities for man-in-space and Minitrack stations which NASA will operate but will furnish data to Defense.

The need is recognized for two closely cooperative data reception and analyses centers; one operated, largely to meet scientific requirements, by NASA as a continuation and expansion of the Vanguard Center, and one operated, as a prototype to coordinate national defense surveillance requirements, by the Department of Defense. The latter is under Spacetrack management at the Cambridge Research Center. The two centers will exchange data freely and provide mutual support for the national program.

In addition, work on a satellite detection "fence" is being continued by the DOD. The purpose of this fence is to produce a capability for detecting, identifying, and predicting the orbits of all space vehicles passing over the United States. Construction is essentially complete on this experimental system, which involves both Minitrack and Doploc stations, extending generally across the southern part of the United States.

To provide backup for its many programs of vehicle, payload, and tracking development, ARPA is pursuing numerous programs for basic and exploratory military research involving auxiliary power systems, solid-propellant technology, and other space-related fields.

I hope that this rundown of our ARPA space activities and planning testifies to the fact that there are no limits imposed on our military space program by lack of desire or imagination or management control.

In closing, I should like to note that our defense space activities, necessarily oriented as they are to national security objectives, are a part of an overall national program in which the work of an overall national program in which the work of the National Aeronautics and Space Administration, in its area of responsibility, is correlated with that of ARPA, and in which both are interdependent and mutually supporting. I should like to assure you that the program and plans I have outlined here today are consistent with the work to be done at NASA and that the two agencies are working very closely to insure that the requirements of both are adequately supported in the overall national space program as developed under the President and the Space Council.

Thank you.

The CHAIRMAN. Thank you very much, Mr. Johnson.

That is really an amazing statement.

Now, the next witness we have is Mr. W. M. Holaday, Director of Guided Missiles, and Chairman, Civilian-Military Liaison Committee.

Now, Mr. Holaday, if you wish to proceed with your statement, we can question you following completion of the prepared statement.

**STATEMENT OF WILLIAM M. HOLADAY, DIRECTOR OF GUIDED MISSILES, OFFICE OF SECRETARY OF DEFENSE, AND CHAIRMAN, CIVILIAN-MILITARY LIAISON COMMITTEE, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

Mr. HOLADAY. Mr. Chairman, members of the committee, I appreciate this opportunity to appear before you and to discuss the role which I have with respect both to the Department of Defense and to the National Aeronautics and Space Administration.

Dr. York has outlined to you my position as a special assistant to the Secretary of Defense in the guided missile field in which I will assist in providing an orderly transfer from the research and engineering phase into the production and procurement phases, and will monitor the production and procurement phases.

I would like to discuss briefly my position as Chairman of the Civilian-Military Liaison Committee, the activities of the Civilian-Military Liaison Committee, and finally, because I believe it will be of special interest to you, to touch on some of the highlights of the ballistic missiles program.

As Chairman of the Civilian-Military Liaison Committee I am responsible for assuring complete exchange of information and program coordination in the national space program as carried out by the Department of Defense and the National Aeronautics and Space Administration. To meet this objective I have directed my efforts toward making the Committee a functioning organization under which the key personnel of NASA and DOD are becoming familiar with the programs and program objectives of the two agencies.

While the Civilian-Military Liaison Committee is still in the very early stages of its operation, I am able to say that we have had four meetings to date and that we meet on a regularly scheduled basis on the second Tuesday of each month.

As a part of its operation, the Committee has initiated work which has resulted in a combined DOD-NASA study of the problems of tracking satellites. Prior to CMLC action, the National Aeronautics and Space Administration had its own tracking organization as well as certain plans for extending it, and the Department of Defense likewise had plans for certain tracking organizations. The results of the study, which is not quite complete, are such that an integrated plan for achievement of this capability from a national standpoint is underway at the present time.

We expect that the CMLC mechanism will smooth considerably as the overall program becomes better established. The Committee will then be able to devote its efforts toward the achievement of a closely integrated program, making maximum use of the capabilities of both agencies.

With respect to the missiles, I plan to confine my remarks to the ballistic missiles program. In this area we are making extremely good progress, and as you know, have essentially completed our development programs for the Thor and Jupiter. The Thor has been deployed to the United Kingdom and we expect to deploy the Jupiter in the very near future. The achievement of the development objectives of these two programs is a real demonstration of the capabilities of our scientists and engineers in that they were able to start essentially from scratch and in a very short period of time solve the necessary problems and have available for deployment modern weapon systems.

In addition to the Thor, Jupiter, and Atlas programs we have, as you know, the submarine-launched Polaris intermediate-range missile and the Titan and Minuteman intercontinental ballistic missiles. We feel that all three of these missiles are proceeding in a satisfactory manner. Both the Polaris and Titan are now in the flight test stage and, while we expect some difficulties, we can say that we have not encountered any major problem areas in either of these two systems

which would give us cause for concern as to their becoming effective weapon systems.

The final missile I wish to discuss is the Minuteman intercontinental ballistic missile. I believe it is particularly important to place the Minuteman in the proper perspective at this time with regard to the other missiles because it does appear to be so attractive.

The Minuteman characteristics are specifically planned to be a second-generation intercontinental ballistic missile, taking into account all possible advances of the state of the technical art. Because it is being designed to have certain highly desirable characteristics, the Air Force has recommended and we are supporting a continuing high priority, orderly development.

While it is a second-generation ICBM, it should not be considered a replacement for the Atlas-Titan missiles. It will succeed in removing many of the limitations associated with these missiles, but it also does not have some of their capabilities which are needed from the military viewpoint. The program on which we are now proceeding under the highest Department of Defense priority is consistent with our aims to produce a Minuteman operational weapon system having the desired characteristics and at the earliest practicable date. Coming in a later time frame, Minuteman will combine with the Atlas-Titan-Polaris systems, giving us added flexibility and presenting in its time period a more positive deterrent to a potential aggressor.

In summarizing the ballistic missiles program, we are meeting our schedules, and we are continually reviewing our program to determine the desirability and feasibility of increasing or modifying our effort on these programs to maintain a balance in our overall total military posture.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, sir, and I thank all of you three gentlemen for very fine statements.

Now, I want to ask Dr. York a few questions in reference to the program.

We have already probed rather deeply the question of responsibility in the Defense Department, and as I read the directive that Dr. York received on February 10, this directive in effect gives Dr. York full and complete—I could say dictatorial—authority to get this space program, especially the ballistic missile program, in shape so it will move forward with the utmost speed. That is correct, isn't it, Doctor?

Dr. YORK. My authority refers to all research and engineering programs, Mr. Chairman.

The CHAIRMAN. Well, the ones that we are especially interested in now, of course, are the ballistic missile and the space program.

What changes do you plan to make, Doctor, under the new authority that you have received from the Secretary of Defense?

Dr. YORK. Changes with regard to what, Mr. Chairman?

The CHAIRMAN. Well, first, the organizational setup. Do you plan any changes whatsoever?

Dr. YORK. My office, of course, is one which has replaced the prior office of the Assistant Secretary of Defense for Research and Engineering, so that the office will be composed and made up largely of the people who came from that office.

In addition, people from Mr. Holaday's office, the men that he had that were engaged in the research and engineering aspects of ballistic missiles will be transferred to my office.

Then I am in the process of trying to recruit some people from outside of the Pentagon to come in, with special reference to military systems, that is, to be able to work with me and the military departments on a group of military systems of special major interest.

The CHAIRMAN. You have no other changes in mind at this time?

Dr. YORK. No organizational changes within the office.

The other things I have in mind are attempting—and I have made some start at it—to develop a closer working relationship between the office and each of the military service research and engineering groups and, of course, with ARPA.

The CHAIRMAN. Now, you testified as to the million-and-a-half-pound-thrust engine. What do you propose to do, Doctor, to speed up that program?

Dr. YORK. Sir, Mr. Johnson testified with regard to the million-and-a-half-pound-thrust engine.

The CHAIRMAN. You did not testify yourself? I thought you mentioned it. Well, we will ask Mr. Johnson.

Dr. YORK. This is part of the space program, and under Mr. Johnson's management and responsibility.

The CHAIRMAN. Mr. Johnson, what is planned to be done to speed up that program?

Mr. JOHNSON. I have a reference here which I would like to refer to.

The CHAIRMAN. I might say, while the doctor is looking for the data he has in mind, that some of the questions that may be asked you gentlemen this morning may evoke classified answers. If that is the case, you are at liberty, of course, to refuse on the ground that it is classified material.

Mr. JOHNSON. Mr. Chairman, I brought up some figures to date this morning, knowing that this committee had visited Huntsville recently.

In our original program on the cluster that we agreed with General Medaris for funding in 1959 and 1960, it amounted to \$63 million, \$23 million of it for 1959 and \$40 million of it in fiscal year 1960.

I have received information from him yesterday indicating that this activity could be stepped up, and that more funding could be intelligently used.

The CHAIRMAN. What did you receive in the way of information from him about speeding up that program?

Mr. JOHNSON. It would appear that we should proceed rapidly to build a launching pad at Cape Canaveral, and I have therefore asked from the Defense Department emergency funds in the amount of \$7.6 million to build this launching facility, and Dr. York is approving this, and this will be transferred to the ARPA appropriation.

In addition, we are in 1959 committing \$3.4 million for a long lead-time items. Therefore, the funding will grow from \$23 million to \$34 million.

The CHAIRMAN. Of course, that launching pad has to be built before you can launch a million-and-a-half-pound-thrust vehicle?

Mr. JOHNSON. That is right. We have a static test stand which is adequate to test the vehicle but not to launch it.

The CHAIRMAN. Proceeding as you are, what difference will you have in the timetable on the million-and-a-half-pound thrust?

Mr. JOHNSON. The timetable will be stepped up a little. It is hard to say at this time how many months, but certainly we will be able, I think, to go ahead with the four vehicles that we have ordered on a little earlier timetable.

The additional funding, however, which General Medaris and Von Braun and this group have suggested, amounts to adjusting the program in the upper stages, speeding up the upper stages, and these are being studied now.

As I say, I only received this information yesterday, and we are not in a position to fund it or to say that we can have a program for the upper stage development in the next couple of weeks.

The CHAIRMAN. They made this request of you?

Mr. JOHNSON. This is a recommendation to me based on requests I made of them to study the total vehicle in the upper stages as well as the cluster, itself, and to come to me with a program, a technical program. I have just received it.

The CHAIRMAN. And you say you are not in a position to fund it at this time but you hope to be in a few weeks?

Mr. JOHNSON. I hope to be able to decide in a few weeks whether this program, which they have submitted only with a broad sweep of the brush, is something we should proceed with. I do not have the detailed backup. You see, I received only a generalized communication yesterday.

The CHAIRMAN. Well, now, when you say you will be in a position to make a decision, does that involve Dr. York, too, or can you make that decision?

Mr. JOHNSON. No, I think I can make the decision as long as I have got the money. But the problem here is if we proceed with work now on the upper stages as recommended, we can't do anything about it in 1959; we couldn't add very much money to it in 1959, but in the 1960 phase it might require something like \$15 million, which we do not now have programmed.

This would mean that I, in the ARPA budget, would have to reprogram to get this \$15 million directed in this manner.

The CHAIRMAN. Doesn't the ARPA budget have enough money to fund that request?

Mr. JOHNSON. ARPA's program is fluid, and I am quite sure if this turns out to be a good thing to do, we can reprogram within the ARPA budget. We will make every effort to do that.

The CHAIRMAN. You will pass on that in the next few weeks, and it doesn't involve Dr. York?

Mr. JOHNSON. That is right, sir. This is within the authority of ARPA.

The CHAIRMAN. Well, let me ask you about the Nike-Zeus program.

The committee expressed deep interest in the Nike-Zeus program because that seems to offer about the only program for actual defense of this country against the ballistic missile that we have at this time.

Since that is the case, tell us what change this reorganization will have in speeding up the Zeus program.

Mr. JOHNSON. I would like to refer this question to Dr. York.

The CHAIRMAN. Doctor, it is your question.

Dr. YORK. Sir, the Nike-Zeus program, in particular, and in fact the ballistic missile defense program in general, consists of a number of independent components handled by the various military services.

The Nike-Zeus program is a research and development program under the cognizance of the Army.

The CHAIRMAN. Well now, you have charge of that, don't you, under the new directive?

Dr. YORK. Yes, it is included in all research development test and evaluation.

The CHAIRMAN. Are you thumbs down on that program, as to speeding it up or are you going to get behind it and speed it up?

Dr. YORK. We do have plans to speed up the research and development program on Nike-Zeus, and on other related programs for ballistic missile defense.

The CHAIRMAN. Do you feel that that is such a vital program to our national defense that you are willing to proceed on that program on a production basis at this time?

Dr. YORK. Sir, the question of production would be one over which I don't have authority. My field is research, development, test, and evaluation.

However, I would not at this time recommend proceeding all out on the production of the Nike-Zeus.

The CHAIRMAN. Why wouldn't you recommend it, Doctor?

Dr. YORK. Because the development just simply isn't far enough along to enable us to know satisfactorily how we are really going to build a workable system. That is, we are all—certainly including me—of the opinion that it is of the highest national urgency to have a workable anti-missile-missile system. We think the best way to achieve that is to emphasize the research and development on the Nike-Zeus program, and as I said, other programs, all of which are being expanded, and at such time as the technical developments allow and further review can be made of the comparison of this program with other programs, we would then make the decision to go ahead.

In the meantime, we are studying the question of what measures to take in order to prepare long lead-time items, what measures we should take toward the development of production methods for some of the more difficult items, and so forth.

The CHAIRMAN. Well now, under our timetable the Russians will have perfected an ICBM before we will have production on a defensive weapon, the Zeus; isn't that right?

Dr. YORK. That is correct.

The CHAIRMAN. Well, what are we going to do during that period when we stand naked and unprotected against the ICBM?

Dr. YORK. We will have to rely, as we would have to do under any circumstances, rely primarily on our deterrent capability, that is, on the threat of retaliation.

The CHAIRMAN. You would rather rely on your deterrent capability than to take a calculated risk in proceeding with more dispatch on the Zeus program?

Dr. YORK. Sir, under the most optimistic assumptions, the Zeus program is not by any means—we cannot have the Zeus system ready to meet the early threat. We are getting here into some timetables,



and so forth, that perhaps we should reserve for an executive session.

The CHAIRMAN. If you would desire that, I would ask you in an executive session. But it has occurred to this committee that there will be a period of several years during which this country will not have a defense against an ICBM, and Russia will have perfected an operable ICBM.

Dr. YORK. Yes; but I am afraid there is nothing we can do about that.

The CHAIRMAN. Except take the calculated risk?

Dr. YORK. No, sir; we cannot have a Nike-Zeus system ready in time to meet the threat.

Mr. McCORMACK. Would the gentleman yield there?

The CHAIRMAN. I yield to the majority leader.

Mr. McCORMACK. Assuming the Soviets perfected a defense against our intercontinental bomber, where are we then with the advantage you admit they will have on the intercontinental ballistic missile?

Dr. YORK. Assuming they had a perfect defense against the bomber.

Mr. McCORMACK. They don't have to have a perfect defense, just the high attrition rate. Where would we be, connecting those two things?

Dr. YORK. We would be in a difficult position.

Mr. McCORMACK. A sad position, wouldn't we?

Dr. YORK. Well, I am sure we will be able to get through any defense that is not perfect, and I am sure their defense will not be perfect.

Mr. McCORMACK. You have to be realistic. These questions are not asked by any of us without being based upon profound respect for everything you are doing, but we still have our own concern. We all have our responsibilities, as you realize, but it is reasonable to assume they are trying to perfect a defense themselves against our missiles.

Dr. YORK. Against missiles; yes.

Mr. McCORMACK. And isn't it reasonable to assume if they are trying to perfect a defense against missiles, that they are trying to perfect one against the bomber?

Dr. YORK. Yes, sir.

Mr. McCORMACK. It would be much easier to perfect a defense against a bomber, going much slower, than a missile?

Dr. YORK. Yes, of course, that is the situation in this country, too. We do have under development and in production a system which would be of considerable value against bombers.

Mr. McCORMACK. I know. I understand. But you have got my point, haven't you? If they perfect the intercontinental ballistic missile before we do, and they perfect a good defense against our bomber—you have to connect the two. I understand retaliatory force and the law of self-preservation. I understand that. If we have a retaliatory power, I can realize then that the law of self-preservation applies to them as well as to us. But suppose they get an advantage on us?

Dr. YORK. It is a question of how big the advantage is, and as far as our development programs are concerned, I don't think they have got that big an advantage.

Mr. McCORMACK. Well, have you got information to that effect? I won't ask you to give it, but are you satisfied in your own mind and in your own conscience, based on the information that you have, that that is so? Because the conscience involves 180 million Americans, you know.

Dr. YORK. Speaking in terms of research, development, test, and evaluation, which is the scope of my job, I am satisfied with what we are doing in round terms.

Mr. TEAGUE. Mr. Chairman.

The CHAIRMAN. I am just going to ask you one more question, and then I am going to call on Mr. McCormack. He may have to leave a little early. I want first to express the feeling that we are proceeding in the right direction in getting some order out of chaos that has developed in the ballistic missile program.

I want to say that I hope you use your authority, sir, and that you are able to cut down the leadtime on some of these programs and the time for decision.

We have heard a great many complaints about the slowness of decision in the Pentagon. Now, you have the authority, it seems, under this new directive, and I want to express the hope that we do get quicker decisions, and we reduce the leadtime.

I believe that is all.

I will recognize Mr. McCormack.

Mr. McCORMACK. Well, I will be here for a little while, so recognize some of the other members.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I am glad to have you gentlemen here, and I think you are doing a good job.

Of course, on any shopping list for weapons you can't have them all, you can't make them all, and that has always been the case in any military system; is that not right?

Dr. YORK. Yes, sir.

Mr. FULTON. So that what we have to do is decide the ones which at the particular time will give us the most defense or the most bang-bang for the dollar; isn't that the case?

Dr. YORK. That is always true.

Mr. FULTON. Then, likewise, operating on our security estimates and our Central Intelligence Agency reports as to what any possible enemy is doing, we then come up with an opposite force which neutralizes; isn't that correct?

Dr. YORK. Yes, I believe so.

Mr. FULTON. So that we are really estimating ahead; and there can be a difference, a legitimate difference of opinion as to what the future will hold; is that not right?

Dr. YORK. Yes. It is a most difficult problem to anticipate both their accomplishments and our requirements in the face of those accomplishments.

Mr. FULTON. And in making up the budget, you have to look at the total overall picture of the economy of the United States inflation, and what you are going to extract from the taxpayer, too, in taking into account what the Department of Defense should do, both on research aid development as well as on operations and manufacturing missiles, is that not right?

Dr. YORK. Yes, sir; although such matters as inflation, and so on, don't come under my cognizance.

Mr. FULTON. But the basis of decision is broader than just a particular weapon or a threat in one year in the future, is it not?

Dr. YORK. It certainly is.

Mr. FULTON. Then there is no doubt, I believe, that we would concede that the Russians have, say in 1960, more ICBM missiles than we will have Atlases and Titans; isn't that correct?

Dr. YORK. I believe that is the conclusion based on the information that we know, that the Russians could have more ICBM's than we will have Atlases and Titans.

Mr. FULTON. But at the present time we are pretty well up on our defense on the short-range missiles, the Honest John, the Corporal, the Sergeant, and the Redstone, which we don't think they have anything like, as against their T-8, T-5, the Comet, and the T-7, and I think we have an edge at Redstone under von Braun.

Dr. YORK. I am not sure that we really do.

Mr. FULTON. Well, I am trying to help you. You should say yes.

Mr. McCORMACK. Well, you want him to tell us what he is thinking.

The CHAIRMAN. I want to commend the witness for his candor. I think that is what the committee wants.

Mr. FULTON. I would commend him for his modesty, but I don't want him to be overmodest, because we are talking about the estimates as to short-range missiles, and while it might be a very becoming thing to have modesty before this committee, it might not be too good when we come to the propaganda and psychological war we are in, to not be sure that we are ahead of them on the Redstone missile, which of course we are.

Then on the intermediate-range, of course we have the Pershing and we are going to have the Polaris, the Thor, and the Jupiter. We were down at Redstone Arsenal, and I want to compliment the Redstone Arsenal, and the Ballistic Missile Agency, for their progress.

The Russians have the T-1, the Comet-2, the T-4, the Goadem-2, and the T-2. I believe with our progress on the Thor and the Jupiter and with our moving into cluster on the latter, we are really making fine progress in relation to them, aren't we?

Dr. YORK. Our progress relative to theirs is something I think we can be proud of at the present time.

Mr. FULTON. Because it has been under ARPA previously, I ask Mr. Johnson, on these shorter range missiles, we are stacking up pretty well with the Russians, aren't we?

Dr. YORK. They have not been under ARPA, short-range missiles.

Mr. FULTON. On the previous question, I am speaking of, on the shorter range missiles, the Honest John, the Corporal, and the Redstone, of the United States, we stack up pretty well against their T-5-B, their Comet-1, and the T-7 of the Russians?

Mr. JOHNSON. It is my personal opinion, yes; but as Director of ARPA, missile production, missile development, was not under our cognizance, so I can't speak as a Director of ARPA, but I speak as an individual.

Mr. FULTON. Well, who can speak as to that?

Dr. YORK. Sir, ARPA is responsible for the space programs of the Department of Defense and responsible for certain advanced ballistic missile development and research programs and for certain programs in solid-propellant chemistry. It is not, and never has been, responsible for short-range missiles.

Mr. FULTON. No; but who is in a position to give a calculation of the security base of this country on these various missiles, the short range, the intermediate range, and ICBM fields? Who do we ask as to that?

Dr. YORK. You would go to CIA, I suppose, as to getting the intelligence picture and ballistic picture on these things.

Mr. FULTON. Well, don't you fellows calculate the punch on the research and development you are doing on your own weapons as compared to what the other fellow is doing, or are you just doing them in a vacuum?

Dr. YORK. That is true.

Mr. FULTON. Then we are coming up with the solid-fuel Minuteman, so in 1962 we will have these solid-fuel Minutemen deployed around the earth in bombproof shelters and at shorter ranges than the Russian's ICBM's. Won't we be able to knock anybody's block off, regardless of ICBM's?

Dr. YORK. Not in 1962 for the Minuteman.

The CHAIRMAN. Doctor, may I interrupt for a moment. The members at each end are not able to hear your replies. If you could speak just a little louder we would appreciate it.

Mr. FULTON. Well, we will have the Minutemen in 1962, but we will only have them in large numbers in 1963?

Dr. YORK. Sir, these deployment dates for weapons systems like Minutemen are all classified information as far as we are concerned.

Mr. FULTON. Well, I have from outside sources than you, and I believe that by 1963 we would be well along with the Minuteman program.

Mr. OSMERS. Mr. Chairman.

The CHAIRMAN. If that is classified, we will get into that in executive session.

Mr. FULTON. All right. Then on the appointment of this Space Council, there is a Space Council to be appointed of nine members—Eisenhower, Dulles, McElroy, and six others. They were to have an executive secretary. Has that executive secretary post been filled yet, because that is where the overall policy is set on space. I am going to ask you what your contact is with that Council.

Dr. YORK. My contact has been rather minor with that Council because Mr. Johnson usually handles those matters or Mr. Holaday, who is Chairman of the CMLC. I do have contact, of course, with it. As far as I know, there is no executive secretary appointed under the terms that the law allowed.

Mr. FULTON. Under NASA, National Aeronautical and Space Agency, there is Phillips who is a temporary executive secretary of the Council, is that not right?

Mr. JOHNSON. I do not think he is temporary. I think it is a full-time job.

Mr. FULTON. Well, has his name been sent up to the Senate, because it requires Senate confirmation?

Mr. JOHNSON. That I do not know.

Mr. FULTON. Then, in addition to that, the three other employees, have they been hired to get that into operation?

Mr. JOHNSON. I do not have that information.

Mr. FULTON. Well, I hope the Administration moves in that field. Now finally there has been a recommendation evidently that a gentleman from Texas named Mahon has said there should be \$700 million more spent in the current fiscal year for missile work and that we will then be catching up with the Russians. Is that correct; is it necessary; and if not, why; and that is my last question?

Mr. HOLADAY. The question that you put as to the \$700 million, I read that in this morning's paper, there are many items in connection with advancing this program besides just building the missile. It is true that we could increase production of Atlas missiles. We could probably step up or start to step up the line on the production of Titan missiles. However, this is only one phase of the problem of deploying missiles. We have to relate this to our ability to construct bases, the type of base we construct. It also has to be related to the training of personnel, so I can say to you that there could be, if we made the money available, an increase in production but we better have our military advise on this question before we plow ahead at a very rapid rate.

There are many factors as to the construction of bases and training of personnel that must be taken into consideration in any problem of this type.

Mr. FULTON. Could you then give us a formal statement by the Department of Defense on this particular question for our committee record at this point?

Mr. HOLADAY. I think our Department of Defense is pretty well on record at the present time that we are supporting the present program we have, in the form of the present budget for 1960.

Mr. FULTON. That is all. Thank you.

The CHAIRMAN. Mr. Teague.

Mr. TEAGUE. Dr. York, the Army has responsibility for the Nike-Zeus?

Dr. YORK. That is correct.

Mr. TEAGUE. Have they recommended going into production?

Dr. YORK. The Army did recommend going into production last fall.

Mr. TEAGUE. And what are the reasons for not going into production?

Dr. YORK. Sir, I would rather not expand on that any more than I did for the chairman except in executive session because this involves the question of dates things might be ready, and what are the difficulties, and so forth.

Mr. TEAGUE. Is it more from a budgetary standpoint or scientific standpoint?

Dr. YORK. As far as I am concerned, it is from a technical standpoint. It is a question of what point we have reached in the program and is it now timely to begin an all-out development program.

Mr. TEAGUE. According to a Sunday paper the best scientific brains have recommended against going into production. Have there been some scientific brains who have recommended going into production?

Dr. YORK. Let me exclude the people working actively on the project, because you would expect that the people working on it would be enthusiastic about it. You will always find that. Excluding those, there have been some who felt it was worthwhile going ahead, but of the ones I have talked with, it certainly is overwhelmingly the other way.

Mr. TEAGUE. Doctor, is this the only antimissile missile that we have, that we are working on?

Dr. YORK. It is the only antimissile missile that is in a development stage. The Advanced Research Projects Agency is doing work which is being expanded in research and development of other aspects of missile development. You may want Mr. Johnson to expand on that. In addition, there are programs as to missile detection which are of interest in connection with missile warning, missile defense, and also defense of SAC, and so on. These programs are generally also being expanded at the present time.

Mr. TEAGUE. What would you have to lose if you went into production now? Would you not gamble more on gaining than losing if you went into production now?

Dr. YORK. If it did not work and we deluded ourselves that it would, we would lose a great deal. When you take a research and development program and decide now is the time to produce, the record essentially is no matter how hard you try the research and development slows down, the design is frozen and you go ahead and if you go ahead at the wrong time with a system that has not yet been proved out or very few components of which have been proved out, if you go ahead too early you end up behind and not ahead.

Mr. TEAGUE. Where does the Nike-Zeus compare with your Thor, your Jupiter, your Polaris, the rest of them?

Dr. YORK. The Nike-Zeus rocket per se is the least difficult part of the system. The Nike-Zeus rocket is something which we could build with no difficulty, but the Nike-Zeus system is very much more than just a rocket. It consists of radars, computers, other things of that sort, and it is on this side where the development is, in my judgment and that of most other scientific people I have talked with, not at the stage where it is ready to go ahead.

Mr. TEAGUE. Mr. Chairman, I have no other questions.

The CHAIRMAN. Mr. Osmers.

Mr. OSMERS. Mr. Chairman, before I ask my two questions I would like to make an observation quite respectfully. If the committee is going to question witnesses such as we have before us today on such matters as timetables, relative development, and possible gaps in defense, and so on, that testimony should be taken in executive session, and then it should be released to the public or we should release to the public only those portions of the testimony that will not reveal anything of help to the enemy about our defense posture. Now I realize when people say "Yes," or "No," or "I cannot answer in public hearings," these things have certain meanings to the enemy that they may not have to some members of the committee. I have two questions.

Mr. FULTON. My questioning was based on magazine and newspaper reports published on the basis of statements from other Department of Defense officials.

Mr. OSMERS. I did not specifically direct myself to you, Mr. Fulton, but now that you have mentioned it, I will say to you the fact that there are magazine articles means that there are magazine articles, but when you ask these three Americans about the dates, their answers or their failure to answer has a significance that is entirely different from a magazine article.

Now my two questions are these, Mr. Chairman.

Mr. FULTON. Now wait.

Mr. OSMERS. I do not intend to debate the issue. I permitted you to ask question after question after question most of which turned out to be statements of lists saying they have this and this and this, and they were not seeking information at all.

If you do not mind, Mr. Fulton, I would like to ask my two brief questions. They are one, do you gentlemen feel that you have available to you sufficient enemy intelligence, general intelligence as to what the enemy is doing in your field to be able to intelligently direct programs under your direction?

The CHAIRMAN. Who wants to answer that? Dr. York, do you want to answer that?

Mr. OSMERS. You can answer it individually or one of you can answer it.

Dr. YORK. By and large, I think we probably do have enough intelligence to make up an intelligent program of our own. There certainly are things that we would like to know that we do not know, but I think the consensus is we know enough so that we can have an intelligent program.

Mr. OSMERS. Mr. Chairman, does Dr. York feel that he has available all of the information that is available to the country in this field? Let us put it that way. I am sure no one has all of the information he would like to get.

Dr. YORK. I feel that I have a good—I do not know whether it is all, but it is a pretty good fraction.

Mr. OSMERS. The second question, Mr. Chairman, is based on the information that is available to these three scientists in their various capacities: Do you feel that the programs of this Nation, with respect to the various fields in which you operate, are sufficient, taking into consideration the intelligence estimates, or not?

Dr. YORK. Do we feel that the programs are sufficient as they stand?

Mr. OSMERS. That is correct; adequate is the word I would rather use than sufficient.

Dr. YORK. I think as far as I concerned, which is the overall research, development, test, and evaluation, that it probably is adequate. Of course, the purpose in our being here and the purpose in our being in our jobs is to try continuously to improve the situation. I have only recently moved into my present job. I have not by any means reviewed everything that is going on. I am in the process and will be for the rest of my tenure in the process of reviewing what is going on. I, however, know the people who have been in charge in the past, in the Office of the Secretary of Defense, and the people who have been in charge in the military departments of the various programs. I know them quite well and I have unbounded confidence in them. I think the programs are adequate, the overall program.

Mr. OSMERS. Do the other two witnesses—

Dr. YORK. That is not to say it cannot be much improved.

Mr. OSMERS. Do the other two witnesses in general subscribe to Dr. York's feeling in that regard?

The CHAIRMAN. Mr. Johnson.

Mr. JOHNSON. Mr. Congressman, in the area in which I have responsibility I do feel that we are, first, getting twice as much information, intelligence information, from what is going on in Russia than the cynics think we are, and half as much as I think we ought to get.

Secondly, based on the information that is available—and I think all of the information that is available has been given to me; I am visited frequently by the people who communicate this information—based on this, I think that the programs we have initiated in the two significant areas that I am responsible for, one being space military technology and the other being advance research in our defense from ballistic missiles, that we are doing everything that we can now do and I do think at the rate we are going if we are behind the Russians that we will overtake them in a reasonable period.

The CHAIRMAN. What about you, Dr. Holaday?

Mr. HOLADAY. Well, since both of these fellows said "Yes" in several words, I will say "Yes" to both questions.

The CHAIRMAN. I will ask this question: What would you call a reasonable period in which to overtake the Russians?

Mr. JOHNSON. Well, it is my feeling in the areas in which I am responsible that we can at the rate we are going overtake the Russians in space technology and I think technically have on paper a reasonable defense from the missile in the next 3 to 4 years.

The CHAIRMAN. Mr. Osmer, do you have further questions?

Mr. OSMERS. Not at the moment.

Mr. ANFUSO. Mr. Chairman.

The CHAIRMAN. All right, Mr. Anfuso.

Mr. ANFUSO. Gentlemen, it is my frank opinion that the Russians pretty much know about our programs. They know about our failures and what we are trying to do. I do not think that so far we have hidden anything from them. That is the way democracy works and I am afraid we cannot improve on it. I am in great favor of this democratic way of approaching things and I am in great favor of letting the people know just what our failures are and I think if we do that the public will follow us in this program, will follow you gentlemen.

Now without revealing anything to the enemy, and I do not think we are, can you gentlemen tell the American public at this time whether we have the balance of power, taking everything into consideration, our Strategic Air Command, our atomic bombers and everything?

Dr. YORK. Sir, within our capabilities to judge this question which is beyond what we are normally charged with by quite a bit, we believe that we do have the balance of power at the present time.

Mr. ANFUSO. And you are basing that on the intelligence which you have received from CIA, which you gather every day, I assume, and you are basing that, I suppose, on our Strategic Air Command, is that right?

Dr. YORK. We are basing it to a very large extent on the fact that the Chairman of the Joint Chiefs of Staff said "Yes" and this is in his field of responsibility.



Mr. ANFUSO. Well, now our main force at the moment is our Strategic Air Command, is it not?

Dr. YORK. That is our main retaliatory force.

Mr. ANFUSO. Would you say there is a possibility of atomic bombers becoming obsolete in the near future?

Dr. YORK. You mean large bombers carrying atomic weapons?

Mr. ANFUSO. Yes.

Dr. YORK. In the future two things will happen. One is it will become more difficult for bombers to penetrate. Defenses will be improved. On the other hand, the bombers are being improved, to fly higher and faster. So a bomber like the B-47 will eventually go the way of the B-36, namely become obsolete, but of course we are working on much faster and more sophisticated bombers and I assume they are too. In addition there is coming along, as I think everyone has been hearing, the ICBM, which will come along, which will certainly augment the bomber; whether it will replace it or not, make it obsolete or not, is another matter. I think it will not in the foreseeable future, but the ballistic missile will certainly augment the bomber.

Mr. ANFUSO. Now, Dr. York, if the Russians get ahead of us on these ICBM's, if they produce enough, say 300 or so, much before we can, are we not in danger of losing the next war?

Dr. YORK. Sir, that comes outside the field of research and engineering. All I can do is say the military experts in the Pentagon, the Joint Chiefs, have said that the situation is not as bad as some of the critics have painted it.

Mr. ANFUSO. Secretary McElroy after testifying before the Senate gave this conclusion which I think has been reported by the papers: That we are so far ahead that in 2 years we will catch up with the Russians. Now I would like to ask you one or two questions regarding this airspace that you spoke about, Mr. Johnson. Before I ask you that, you have heard Dr. York testify, you have heard his statement before this committee, are you in full accord with it?

Mr. JOHNSON. The statement in its entirety?

Mr. ANFUSO. The statement he made as to jurisdiction.

Mr. JOHNSON. Yes, I am.

Mr. ANFUSO. So there is no more quarrel about that as to who is ahead of whom or anything like that?

Mr. JOHNSON. Mr. Congressman, the quarrel exists in the minds of the newspapermen. I do not understand that.

Mr. ANFUSO. It never existed between you?

Mr. JOHNSON. Never.

Mr. ANFUSO. I am glad to hear that.

Mr. JOHNSON. I get furious at this line of interrogation because there is no quarreling and I do not understand it. Somebody wants to find a fight.

Mr. ANFUSO. Mr. Johnson, I want to give you this opportunity to make a full statement.

Mr. McCORMACK. I think you welcome the question he asks to give you an opportunity to blow off your steam.

Mr. JOHNSON. I certainly do. There is more quarreling in American industry than there is in the Department of Defense. I have

been down here from industry 1 year and I have gotten more done in 12 months down here than any 12 months in industry.

The CHAIRMAN. May I say this, however: When you make the statement we will not be able to catch up with the Russians for 3 or 4 years, I think the American people do have something to worry about.

Mr. JOHNSON. Agreed, but this is a question that money alone cannot solve. This is a question of the work they did over the last 15 years that we are now catching up with and money and management skills alone are not the answer. We are going to need a little time, and I think this is the time that we will need, but I do believe in this period that we are talking about, that we do hold the balance of power.

Mr. ANFUSO. Mr. Johnson, if the chairman is through—

The CHAIRMAN. Yes, surely.

Mr. ANFUSO. Mr. Johnson, you refer to this tactical cloud cover program. Are you gentlemen represented in this Interdepartmental Committee on Weather Modification?

Mr. JOHNSON. Dr. York represents the Department of Defense in that, yes.

Mr. ANFUSO. Now do you feel that we are doing enough in this weather forecasting and regulation—and I say that in view of the certain statements which have come to me that the Russians are planning to change the climate over their own country. They are planning to change the climate over the Arctic Ocean, and some of our scientists say if they were able to do that even New York City would be under water as well as the entire Northeast.

Mr. JOHNSON. We do not have a responsibility as to weather control, but from where I sit and from work I was familiar with when I was in industry, I believe any claims on the part of the Russians or on the part of magazine writers that Russia will attempt shortly to do these things is overstating the ability and overstating any intention that they have. I think this is something we are overrating, but I do think there is a great opportunity as time goes on to do things with weather control that are not now visualized, but I do not think this is going to happen overnight.

Mr. ANFUSO. Well, if they are able to do these things we have some other form of danger, where cities can be inundated without the firing of an intercontinental ballistic missile; is that correct?

Dr. YORK. That is correct, if you could melt the polar icecap, you would flood New York City, but that is an old scientific notion, and not something of recent origin. The fact someone in Russia says that does not scare me.

Mr. ANFUSO. Do we have an obligation to go into this weather forecasting to a greater extent than we are? We are spending something like a million and a half dollars. The whole committee here thinks that is inadequate.

Dr. YORK. Weather forecasting and weather control are two quite different things. We are spending more money on weather forecasting. The meteorological satellite program, the one Mr. Johnson referred to, and the NASA program later, that is considerably more than a million and a half dollars; and they represent important steps forward in the techniques of gathering weather information, enormous steps forward.

Mr. ANFUSO. Do you regard it as possible someday to be able to control weather, direct hurricanes in a different direction, or bring about storms?

Dr. YORK. Well, there are various degrees. Bringing about storms is probably something nearer than diverting hurricanes, and I think we will learn more about this. We have already made tentative overtures in that direction in the cloud-seeding programs.

Mr. ANFUSO. My last question is: The bringing about of storms might change some of your calculations as to the accuracy of our intercontinental missiles?

Dr. YORK. I do not understand that point, sir.

Mr. ANFUSO. Well, if we are able to create so many storms over the atmosphere, is it not possible that the calculations which you scientists are making as to the accuracy of our intercontinental missiles may be changed?

Dr. YORK. I do not think there would be very much connection there, sir, although I may not have understood the question.

The CHAIRMAN. Mr. Van Pelt.

Mr. VAN PELT. Mr. Holaday, on page 2 of your statement you say the Thor has been deployed to the United Kingdom. Does that also include personnel?

Mr. HOLADAY. Yes, sir. There are differences in the plan of deploying these. Some of them will be deployed, of course, where we use our own personnel. Others will be where we go in and train the personnel of the particular country in which we are deploying. This is true in England. We are training their personnel and they will deploy the missiles.

Mr. VAN PELT. Well, are some of these countries, our friends, as concerned with the intercontinental ballistic missiles as we are, and if so, are they proceeding with their own program?

Mr. HOLADAY. Sir, the British in their recent white paper which they issued on ballistic missiles indicated they would continue the development of their missile known as Blue Streak which is an IRBM missile. We are currently also carrying on and providing technical information for the other countries in Europe, if they wish to develop an IRBM, and I might point out there is considerable interest throughout all of Europe on the deploying and developing of their own IRBM missiles.

Mr. VAN PELT. Would they at any time be able to go into production of some missiles we have developed?

Mr. HOLADAY. Yes, sir, although there are many problems to be solved in that. We believe technically and from a manufacturing viewpoint there is no reason to believe they could not proceed with a development and production program. We would have to give them considerable help, even up to the point of maybe having to supply them with some of the specialized equipment, but there is no reason why the European countries could not develop, manufacture, and deploy missiles of this type. There are also ways and means in which we could aid and assist them through our military aid program to shorten the time period on that by passing to them technical information and also supplying them with some of the specialized equipment.

Mr. VAN PELT. Thank you. That is all, Mr. Chairman.

The CHAIRMAN. Mr. McCormack has to leave early and I am going to call on him now.

Mr. McCORMACK. You said you do not have authority over production, is that correct?

Dr. YORK. That is correct.

Mr. McCORMACK. Who does?

Dr. YORK. The Secretary of Defense.

Mr. McCORMACK. Well, are you not his man?

Dr. YORK. No, sir, for research, development, test, and evaluation I am his principal staff assistant.

Mr. McCORMACK. I see; in other words research and engineering activities, how would you define the words "engineering activities" in your directive?

Dr. YORK. Well, the word "engineering" is expanded—there is an expanded version which is research, development, test, and evaluation, which covers research and engineering. In that case engineering means development, it means testing items which are to go to operational use, and so forth. It means working out where necessary production procedures but it does not include responsibility for production.

Mr. McCORMACK. Well, who does the Secretary of Defense delegate it to?

Dr. YORK. The Secretary of Defense on matters such as production and deployment makes the decision himself after consulting the military services and the Joint Chiefs of Staff.

Mr. McCORMACK. Then he delegates it to some branch, to some one of the services or to you?

Dr. YORK. No, not to me. In no case would it be delegated to me. If it is the Atlas missile, it is the Air Force; if it is the Jupiter missile it is the Army that actually carries out the production.

Mr. McCORMACK. Well, there is a little vacuum there; is there not?

Dr. YORK. I do not think so.

Mr. McCORMACK. All right. Well, Doctor, I noticed one of these directives says recommend, develop, plan—all different words.

Dr. YORK. You are looking under the heading "Functions."

Mr. McCORMACK. Yes.

Dr. YORK. Where it becomes necessary to spell out the authority, it is contained in a different section.

Mr. McCORMACK. These questions are only to get information. We are not being critical. I am trying to get information. I think what has happened is a very good thing. By the way, I did not take much stock in the clash between you two gentlemen. I think you ought to welcome the opportunity to clarify that, Mr. Johnson.

Mr. JOHNSON. I did; yes.

Mr. McCORMACK. Now one of the duties you have under subdivision 8 of the functions is to contract with private business entities, educational or research institutions or other agencies of Government, and it is again referred to under relationships, maintain and arrange for the maintenance of active liaison with appropriate research and development agencies outside of the Department of Defense, and so forth, indicating that there is a great importance attached to that at the top level, is that right?

Dr. YORK. Which part were you referring to?

Mr. McCORMACK. Subdivision 8 of the functions, page 2, and then on page 4, paragraph 5, under the heading of "Relationships."

Dr. YORK. Yes, this is one of the items included within my authority. What was your question concerning?

Mr. McCORMACK. You consider that a matter of top level consideration?

Dr. YORK. Yes.

Mr. McCORMACK. Because private industry spends a lot of money, too?

Dr. YORK. Yes; indeed, they do.

Mr. McCORMACK. Some billions of dollars, and they are doing a grand job. We have got to give credit where credit is due; is that correct?

Dr. YORK. Yes, sir.

Mr. McCORMACK. Does the DOD tap the full potential of private industry by capitalizing on their reported annual expenditure for research and development?

Dr. YORK. Well, we certainly try to.

Mr. McCORMACK. That is all you can do. I understand that. I just want to get this for the record.

Now, they spend several billion dollars a year, too, private industry?

Dr. YORK. Yes; on research, development, and engineering.

Mr. McCORMACK. Then where they have proprietary rights do you protect them?

Dr. YORK. Yes, although I must say this: I am not personally very familiar with some of these legal matters, but we have what I am sure is very good legal counsel on these things.

Mr. McCORMACK. Is there a higher office in the Department of Defense on your level which establishes and maintains a close working relationship with industry, research management, to assure that the interchange is vigorous?

Dr. YORK. We intend to and, of course, each of the services and ARPA also works on that.

Mr. McCORMACK. On the defense level, if not, you intend to?

Dr. YORK. Yes, and I have to admit I do not know the extent to which this is done.

Mr. McCORMACK. I understand. But you recognize the importance of this, of getting all information possible from private industry in connection with the research done by the Defense Department or any of the branches thereof?

Dr. YORK. Yes, sir.

Mr. McCORMACK. The only reason I ask these questions—you attach great importance to that. I want to call your attention to this—you do not have to answer, but simply look into it: I notice in the reorganization or regrouping in the Air Force—and I have a copy here which I will give to you; I would like you to look into it—that until about 3 weeks ago this activity was up on the command level. Now under the new reorganization it is not even mentioned. It is demoted to a part of the technical services in which it, with four other activities, are incorporated, indicating that while you attach—

Dr. YORK. What is the name of the activity in here?

Mr. McCORMACK. Well, the activity was—about 3 weeks ago it was in a high level known as Industrial Relations Division and was

headed by Warren L. Baker. Do you know Mr. Baker? I do not know the gentleman.

Dr. YORK. Not personally.

Mr. McCORMACK. He was head of the aviation division of Socony Vacuum of New York for many years. I imagine he was a very fine man. In this new regrouping or reorganization, whatever you want to call it, from a high command level it has been placed in a category where it is not even mentioned, and in fact it is a part of a consolidation with the Directorate of Technical Services. That is my information. It would seem to me with private industry spending billions of dollars for research and development there should be a very close relationship always between the Defense Department and its component parts and private industry to find out what they are doing and how it might be related to what the military is doing.

Dr. YORK. Well, sir, I cannot speak for this particular reorganizational question, as to what the Air Force has done, but I do know that in the research and development branch of the Air Force they do pay very close attention to this question of what is going on in industry, what is going on that they can make use of, and so forth. Whether it is named as being part of a box or not, I am sure that they do that.

Mr. McCORMACK. Well, this is something that you could look into it; is it not?

Dr. YORK. Yes; I could.

Mr. McCORMACK. Would you do that?

Dr. YORK. Yes.

Mr. McDONOUGH. Will the gentleman yield at that point?

Mr. McCORMACK. I would be glad to.

Mr. McDONOUGH. If private industry is working as assiduously as is indicated on matters of defense and military progress, they certainly are not doing it in the dark. If they have something they come to you or to the Department and inform you of what has been done.

Dr. YORK. If they have what they believe is a good idea and something which should be expanded upon in a way that is beyond their resources, yes, indeed, they come in.

Mr. McDONOUGH. Well, they certainly should not be lax in that respect.

Dr. YORK. They are not timid about it at all.

Mr. McDONOUGH. Do most of the proposals originate in the Department or are they originated in private industry?

Dr. YORK. I would not know as to "most." Certainly an important fraction comes from both sources. I do not happen to know myself which is the most.

Mr. McDONOUGH. Well, that is an important thing in my opinion for the reason that, if the defense is not first alerted to the requirements, we certainly should not depend on private industry to initiate them.

Dr. YORK. No, actually proposals are something which are not born full-blown, the new idea. Normally what will happen is one of the services will put out a request of some sort for a feasibility study or something of that kind, or make a request of one of its operational research organizations to come up with a proposal. Industry may hear about that, or at the time a request for feasibility studies is made, it is generally known that the Department is interested in something

along that line. Industry may add to it, expand it, change it around a little bit, come in with a proposal. It is hard to put your finger on the time exactly and from what source a new proposal or new idea arises, because it grows in a gradual way.

Mr. McDONOUGH. Well, as I recall the history of our military progress over the years, it has been traditional that industry has been far ahead of the Defense Department and the Defense Department has been slow in adopting things that were more effective than the things they were actually doing.

Dr. YORK. Well, there has been a radical change in the last 20 years with regard to matters of that sort.

Mr. McDONOUGH. Thank you.

Mr. McCORMACK. No further questions.

The CHAIRMAN. Mr. Bass.

Mr. BASS. No questions.

Mr. SISK. Mr. Chairman.

The CHAIRMAN. Mr. Sisk.

Mr. SISK. Mr. Johnson, I would like to inquire as to what you feel to be your working relationship with NASA. To what extent are ARPA and NASA cooperating and coordinating their efforts and so on? Would you make a comment on that?

Mr. JOHNSON. Our relations with NASA, which a lot of other people would like to find bickering and quarreling in, are very good. The relationship I think could not be better. There is no reason at all to think that this relationship will not remain on this kind of level. I see no problems organizationally in getting the total space program conceived and put into effect. I deplore the conversation that there ought to be more reorganizing in this effort, we ought to start over again. I think this is completely unnecessary. I think things are going very well and I am quite sure that my associates in NASA would say the same thing.

Mr. SISK. I would like you to comment, Mr. Johnson, on a statement I am going to read to you from an issue of "Management" which just came out. I am sure you are familiar with the publication. It has to do with a statement made by Dr. William H. Pickering. Are you familiar with him? I am certain you know who Dr. Pickering is.

Mr. JOHNSON. Yes.

Mr. SISK. He made the statement in Philadelphia that fighting between research organizations, NASA and others, threaten our chance to achieve a unified space program. He said "That is our real problem," then he went ahead pointing out that the United States largest successfully fired missile was about the size of Sputnik I. He says we are behind them because they have a more unified program. I am not trying to create an atmosphere of controversy, we want to do away with the atmosphere of controversy, but Dr. Pickering is a respected man of our scientific community and a man for whom I have high regard. This is a recent statement and I think it is important that this committee be informed as to what the relationships are, and I think it is important that you people are getting along in the overall state program.

Mr. JOHNSON. If Dr. Pickering made the statement, a good question to ask is when. If it was made recently I am surprised. I think in an organization as large as NASA, and ARPA has 60 or 70 tech-

nicians, you will find individuals who call it bickering when their method of doing is not the way it is done. I do not know that Dr. Pickering had one of his pet projects turned down and therefore called it bickering, but I think when a mutual program is agreed to, all of the troops get behind it and execute it promptly and stop any bickering that may have existed prior to the policy decision. I am therefore a little bit concerned as to when Dr. Pickering made this statement and under what conditions.

Mr. SISK. This statement, Mr. Johnson, was quoted as having been made in Philadelphia about 3 weeks ago, when he was there to receive the award from the National Reliability and Controls Symposium on Space Technology. That was about 3 weeks ago in Philadelphia at the time he was up there to receive that award; in answer to questions from the press as to some of the problems, he made the statement, that frankly he felt our greatest problem was in fighting or controversy. I think that it is important, if it exists.

I wanted to ask you this further question: Are any of you three gentlemen members of the Space Council?

Mr. JOHNSON. We are not. The Department of Defense is represented by Secretary McElroy and Secretary Quarles is the alternate.

Mr. SISK. Well, now can either of you two gentlemen, particularly you, Mr. Johnson, because you head ARPA you should know about this, tell us how many cases of referral to the Council for settlement of differences have there been?

Mr. JOHNSON. None to my knowledge. I think that that is a correct statement, that there are none. I know this: All of the differences have been ironed out at the level of Dr. Glennan and myself and in some cases we have had conferences with Secretary Quarles and Secretary McElroy.

Mr. SISK. You are familiar with the language under section 201 of the act providing for the Council and what its duties are with reference to the performance of these. Now, for example, No. 4 under "E" of section 201 provides for effective cooperation between the National Aeronautics and Space Administration, Department of Defense, and so on, and then finally winding up with 5, resolve differences arising in departments and agencies of the United States with respect to aeronautical and space activities under this act including differences as to whether a particular project is an aeronautical or a space activity.

Now as I understand it, there has been no case of a referral to this agency for a settlement.

Mr. JOHNSON. That is right.

Mr. SISK. At any time.

Mr. JOHNSON. It has not been necessary.

Mr. SISK. And such differences of agreement as there have been have been settled between you and Dr. Glennan or—

Mr. JOHNSON. Other people in the DOD and myself, or Dr. Glennan and his associates, at that level, that is correct.

Mr. SISK. And at the present time there is no pending controversy. You feel you have a clear-cut operation under ARPA and that Dr. Glennan's field is pretty clear cut?

Mr. JOHNSON. No, sir, I would not say that. I would say this is too fluid a situation to say that now we both have clean-cut responsibilities and that they will be concrete a year hence. I think this is



a condition that will be very fluid. We will have to have many conferences on the kind of work we do and the kind of work they do, so that there is no duplication and there may be situations in the future when we would have to go to the Council for settlement. Up to now this has not been true, but I do not think that you can ever have a clean-cut line separating a civilian program and a military program.

Mr. SISK. Now, Dr. York, in your position, of course, you certainly are concerned about coordination and cooperation in the space field. Do you agree generally with the statements of Mr. Johnson that there seemingly is a cordiality of operation?

Dr. YORK. Yes, sir, I do. I was, of course, very closely involved with it when I was in ARPA.

Mr. SISK. Now, Mr. Chairman, if I could ask: Are these gentlemen appearing before us in executive session?

The CHAIRMAN. When we finish today we will adjourn until tomorrow morning at 10 o'clock. We will then proceed to make the rounds on the committee, everybody will have a chance to ask questions.

After that we will go into executive session.

Mr. SISK. I have some further questioning but I think that it would be advisable, because it has to do with some specific programs that I am particularly concerned about, to have it in executive session.

The CHAIRMAN. Are you through with questioning?

Mr. SISK. Yes.

The CHAIRMAN. Since you have mentioned that, I would like to take up one thing here in the open committee because some members are getting away. We find in the office of this committee that we are just crowded to death with carpenters and painters and everything is in a turmoil. I do not see how the people down there are able to work at all. As a result of it, we are just pushed in extremis to find more space. I have an offer here from the Congressional Hotel to lease us four rooms, a suite of four rooms for the purpose of a part of the staff being placed over there. I just wanted to tell the committee that we are entertaining that idea, that we will go over there and get at least four rooms in a suite, and this suite would cost us an annual rental of \$6,000 per year. They will be known as 611. There are about 337 square feet including the kitchen but not including the large closet. There is one additional room, on a lease basis it would cost \$2,700 per year. I mention this so the committee will know what you are up against and know that the staff is working under tremendous handicaps at the present time.

I just suggest to the staff that they undertake the bare essentials of the committee work and in the meantime I know the members of the committee will not expect them to be able to respond with alacrity to individual calls.

Mr. FULTON. Will the Chairman yield?

The CHAIRMAN. I yield to Mr. Fulton.

Mr. FULTON. I believe that if the Speaker cannot give us further space in Government buildings on the Hill that the chairman should then be empowered to go ahead and lease it.

The CHAIRMAN. I do not believe it takes any special action on the part of the committee here at this time. I do want the committee to know of the situation and I propose to go see the Speaker and if there is no available Government space, to proceed with the lease.

Mr. McDONOUGH. Does this mean the Space Committee is running out of space?

The CHAIRMAN. The Space Committee is running short of space. That being the case, Mr. Sisk, have you finished?

Mr. SISK. I have finished questions.

The CHAIRMAN. Mr. McDonough.

Mr. McDONOUGH. No questions, Mr. Chairman.

The CHAIRMAN. Mr. Mitchell.

Mr. MITCHELL. Mr. Chairman, in connection with the space offer at the Congressional Hotel, you know that you will not have a large closet, I do not believe the committee has any skeletons we need a large closet for. I would like to direct a couple of questions as to the Nike-Zeus system, Dr. York.

Are you satisfied with the progress in the development of this system?

Dr. YORK. Well, in the sense that I wish it were much further along than it is, no, but I am afraid the trouble rests with the facts of nature.

Mr. MITCHELL. Well, is it proceeding according to schedule?

Dr. YORK. It is moving forward and we are accelerating it. It is not so far along that you can make very useful judgment as to whether it is proceeding on schedule. The major milestones have not—we simply have not come to what I would regard as major milestones in this program yet.

Mr. MITCHELL. Doctor, do you have confidence in this system? Do you have hopes that someday this will be an operational weapons system?

Dr. YORK. I have hopes that it will be.

Mr. MITCHELL. Hopes and confidence are two different things.

Dr. YORK. It just is not far enough along to be certain.

Mr. MITCHELL. Now, if the question of money were out of the picture, if the money was there, do you have sufficient hope or belief in this system that you would today—no question of money being involved or having to allocate it to other programs—do you have sufficient hope or confidence in it that you would order it into production today?

Dr. YORK. I do not believe that I would, because I know that premature ordering to go into production on something like this interferes with the necessary orderly development program.

Mr. MITCHELL. Would an explanation or elaboration on that require going into classified material, Doctor?

Dr. YORK. I am sure I could make better sense, I am not sure how good it would be even then, but I could make better sense out of my explanation in executive session.

The CHAIRMAN. Let us let it go until tomorrow.

Mr. MITCHELL. Very well; no further questions.

The CHAIRMAN. Mr. Chenoweth.

Mr. CHENOWETH. No questions.

The CHAIRMAN. Mr. Quigley.

Mr. QUIGLEY. Mr. Johnson, when the Medaris-von Braun request came to you yesterday, do I gather from what you said in answer to the chairman's question, that the inevitable answer to that request must be in the negative?

Mr. JOHNSON. Oh, no, sir, I did not mean to imply that at all.

Mr. QUIGLEY. I kind of got the impression, perhaps incorrectly, from what you said that even if you were to give a positive answer the moneys just would not be available in fiscal 1959.

Mr. JOHNSON. No, sir, I am sorry. Let me get my tabulation out here. I thought I made it clear that we had decided to fund everything that was requested in 1959. I will go back to the arithmetic. The program that I worked out with Medaris and von Braun in August, to proceed with the cluster, had as the base program \$23 million in 1959, and \$40 million for 1960. Now the thing that they came up with to go ahead with the launch complex at Canaveral and to give us lead time money, totaled \$10 million. This I have agreed to. So I have brought that up now from \$23 to \$34 million which is everything that we can do in 1959.

Mr. QUIGLEY. In other words, out of the \$40 million requested for 1960, you are already willing to say today that you will anticipate \$10 million of that?

Mr. JOHNSON. Well, what I am doing now is identical in my 1960 budget, the \$40 million, I had \$6 million for this launch. I subtract that from my \$40 million. I had the \$3.4 million of long leadtime in my 1960 money, so I subtract that from the 40, but I am ready to add \$15,600,000 in the 1960 figure to bring that up to \$46 million, so I am ready now to say that we will have \$34 million in 1959, \$46 million in 1960, or a total of \$80 million as opposed to the \$63 million that we agreed to in August.

Mr. QUIGLEY. All right, now as to the request that you received as of yesterday, how much have they requested to be anticipated in fiscal 1959 which you have not yet made a decision upon?

Mr. JOHNSON. Well, let us see now. What they are recommending is that we go ahead with 16 vehicles, just say right now we are going to build an inventory of 16 vehicles and then have the long leadtime money that is required, incremental funding. I am not ready yet to say that we need or want 16 vehicles in the time we are talking about. We agreed we would order four. I can see the need for eight. But I cannot see the need yet for the other eight. We are evaluating now that this capability has been revealed to us. We are evaluating how we would use the additional vehicles in our forward-looking program at an earlier date. The incremental funding there would be another \$5 million only and this decision yet has not been made for 1959.

Mr. QUIGLEY. Whether the number eventually turned out to be 4 or 8 or 16, you are already going to give the go-ahead sign on the launching pad?

Mr. JOHNSON. Oh, yes.

Mr. QUIGLEY. So any leadtime we needed in the construction would not be lost.

Mr. JOHNSON. That is right. We will have that launch facility ready ahead of the firing capability.

Mr. QUIGLEY. And the pending matter before you, as of yesterday, is whether you go ahead and give the go-ahead on the 16?

Mr. JOHNSON. On more vehicles and also the upper stages—are we getting close to classified material now—yes, I think we are.

Mr. QUIGLEY. That is all.

The CHAIRMAN. Mr. Wolf.

Mr. WOLF. Mr. Chairman, gentlemen, I have been fascinated by one idea here for over a year and a half, and I suppose this possibly will be classified material, but I wish it would not be so that the American people could have the same answer I always get. We were off 4 years on our intelligence estimates as to when the Russians would have their first hydrogen bomb. I think you will agree this was true. We were off a considerable period of time as to when the Russians would launch their first space satellite. Further, we failed to estimate exactly the significance that this space satellite would have in the world. Now as a group of scientists, I am very curious to know how you equate the intelligence material you receive, from the light of our lack of ability to have accurate intelligence material, and come up with such things as we are behind them 4 years and all that. I wish you could expound on this in a public session.

Dr. YORK. It is not easy to talk much about intelligence matters in a public session, but it is not correct that we underestimated the time when they would have a satellite. They said they would have it in the IGY. They did have it in the IGY, and we believed in advance that they would have it in the IGY. You may be taking public guesses about what they will be doing rather than official information from CIA when you say that our intelligence has made these large misses. With regard to the hydrogen bomb, I am simply not sure whether we failed to anticipate it by 4 years or not. That is something that would have to be checked up on, and, furthermore, I think the precise information would be classified if we did have it.

Mr. WOLF. Then, Dr. York, would it not be better if we did not tell the people anything rather than to tell them a falsehood? That is what this appears to be.

Dr. YORK. Yes, but it was not one of us that told them. There is no way for us to stop amateur experts from getting up all over the United States and making their guesses and having them turn out to be wrong and that is the source of a very large fraction of this kind of information. It is not official information from CIA or from DOD at all.

Mr. WOLF. You feel, then, that you can equate pretty accurately what the Intelligence Service brings you?

Dr. YORK. I would hesitate to put a measure on that. I feel that we are doing fairly well along that line.

Mr. WOLF. Well, there was an article in Newsweek this past week. We American people who do not have this inside information have to look to the news services. We may be misled by what we read.

Dr. YORK. Yes; but we have no control over what Newsweek says, either us or CIA.

Mr. WOLF. Would it not be good for a statement to come from the Department, then, clarifying this?

Dr. YORK. That is a difficult question, sir. The fact that people who are not in official positions choose to make a guess at some fact should not be used by the Department of Defense or executive agencies as a reason for revealing classified information. I am afraid that at least in an official way if somebody came along and said that our hydrogen bombs are designed so and so and I knew it was false, it would not be up to me to say no, this is how it is.

Mr. WOLF. Well, I can see we are not getting very far on this line of questioning. I would like to ask one other.

Is there any basic research being done on some other weapon to do somewhat the same work as the ICBM?

Dr. YORK. I may be having a little difficulty here, sir, with the question of what is meant by basic research. However, we are certainly doing research and development on many alternatives to the ICBM. The Polaris, for example, is an alternative to the ICBM. The B-70 bomber is an alternate to the ICBM. The Weapons System 125A is an alternative to the ICBM, and then, of course, there are other means than nuclear weapons for waging war also, so I guess the answer is yes, we are doing a great deal in the way of working on alternatives to the ICBM.

Mr. WOLF. In the field of this long distance problem. That is what I was really referring to.

Dr. YORK. Yes, of course, the Polaris and long-distance airplanes carry weapons systems which compete with and are alternative to the ICBM.

Mr. WOLF. For some reason, possibly because I happen to be the father of three little children, I am still a little fearful from some of the testimony given here this morning. This question of our only defense being deterrent during this period of 1962, 1963, 1964—you say that our defense is deterrent, and yet we have had testimony here which demonstrates that the strategic bomber probably couldn't get through in sufficient numbers as a deterrent weapon.

Mr. YORK. I don't know who said it couldn't get through in such numbers. I believe the analysis of the experts in the Department of Defense and the Strategic Air Command is that it could get through in sufficient numbers.

Mr. WOLF. Thank you.

The CHAIRMAN. Mr. Karth.

Mr. KARTH. Mr. Chairman, following that last question, I would like to ask Dr. York whether or not the statement made some sense to him. You are a little skeptical, I think, as to whether the ICBM's make intercontinental bombers obsolete. Now, I think we can assume with a fair degree of accuracy or validity that both we and the Russians have good defense against the bombers. I don't think there is any question about that. We have been developing them for years. However, on the other hand, we have absolutely no defense against the ICBM's, and I just wonder if it makes sense to you, from that observation or other conclusion, that the bomber is fairly obsolete as a deterrent weapon.

Dr. YORK. Well, it certainly isn't obsolete today. I know that the military planners regard it as still being an important part of our arsenal in the middle 60's and beyond. I would hesitate to question their expertness on this matter of what it takes to make up a proper strategic force.

The bomber has a kind of flexibility the missile doesn't have and will retain a kind of flexibility the missile doesn't have for some time.

A bomber, for example, has a man in it; it can be called back; you can change your mind on what to do.

Once a missile has left the ground, it is gone, and if you have made a mistake and fired it when you shouldn't have, this is a fairly serious mistake to have made.

Mr. KARTH. Well, the same mistake is made if you drop the bomb from an intercontinental bomber.

Dr. YORK. That is correct, if he got all of the way to the target and did that.

Mr. KARTH. It wouldn't make much difference which mistake you made.

Dr. YORK. There is a difference, sir, in that the missile is at a fixed place on the ground. When you get, so to speak, a yellow alert, you can have the bomber take off and proceed part way. On a yellow alert there is nothing you can do with the missile except still leave it in the hole. You have to wait until the order comes to actually fire, and then fire and then it is gone, whereas the bomber is something with which you can reach at an intermediate point.

Mr. KARTH. I guess it is the judgment of people like you and those in the military that they would not put up a bomber or fire an ICBM unless they felt that this vehicle must get to the target in a substantially short period of time.

Let me ask you one other question, Doctor: Psychologically, I think the world recognizes that Russia is ahead in this whole field, primarily because they were the first to put a satellite in orbit and, secondly, because they have been able to lift such heavy payloads into orbit. This leads me to another question, and I think that this question, of course, will be answered by posterity. Certainly in the near future it is going to be answered one way or another, and we will be able to determine who was right and who was wrong.

It is my firm conviction if we are second on the moon, that this is going to have another tremendous psychological effect on people all over the world.

My question is this, sir: With what we have today, including all of the necessary items in the budget for advanced research, and so forth, and so on, do you think the manner in which we are proceeding today is going to put us first on the moon, that is, first before Russia?

Mr. JOHNSON. May I answer that question?

Mr. KARTH. Yes, sir; anyone who wants to answer it.

Mr. JOHNSON. The Department of Defense does not have a military objective to land on the moon, and I think the question should be more properly directed to Dr. Glennan. This is not in the ARPA or in the DOD program.

Mr. KARTH. Well, why don't you give me your opinion, then, inasmuch as it is not really in your field?

Do you have an opinion on it?

Mr. JOHNSON. I would prefer not to express an opinion. I think this would be improper because it is in another field, outside the Department of Defense.

Mr. KARTH. I yield to the gentleman from Iowa, who wishes to proceed.

Mr. WOLF. I would like to ask this question: Would you agree that psychological warfare is a part of the Department of Defense?

Mr. JOHNSON. No; I don't think the Department of Defense is charged with the direct responsibility for psychological warfare. This is determined by agencies outside of the DOD.

Mr. KARTH. Don't you think the result of this cold war is extremely valuable from the standpoint of the security of the United States of America?

Mr. JOHNSON. Oh, yes; I agree with that.

Mr. KARTH. And do you agree, sir, if the Russians were first on the moon, this would have a tremendous psychological effect on people all over the world?

Mr. JOHNSON. Unquestionably, yes.

Mr. KARTH. Thank you very much, sir.

The CHAIRMAN. Mr. Daddario.

Mr. KARTH. Let me ask one more question, Mr. Chairman, of Dr. York.

The CHAIRMAN. Excuse me.

Mr. KARTH. I believe you did say the request received from General Medaris—and I may be wrong on this—the request received from the general and Dr. von Braun was in two parts. One part dealt with the launching pad which you saw fit to go ahead with, and the other dealt with additional funds for upper stages, and it seemed to me you said that the second part of the request you had not yet decided upon; you would try to do so in a matter of a week or two, but that if you did decide to go ahead, you could do nothing about it in fiscal 1959.

Now, was I incorrect when I understood you to say that, sir?

Mr. JOHNSON. Well, no; what I meant to say is that he couldn't do anything about it in 1959.

Mr. KARTH. Who couldn't?

Mr. JOHNSON. General Medaris, that is, the agency at Huntsville.

Mr. KARTH. I see.

All right, thank you. That is all I have.

The CHAIRMAN. Mr. Daddario.

Mr. DADDARIO. Dr. York, this morning Mr. Holaday referred to the fact that you have about completed the development stage of the Thor and the Jupiter.

In your statement you refer to the fact that one of your duties is to avoid duplicating procedures and programs.

Now, since the Thor and Jupiter have the same capacity to do the same thing, and since you have to take into consideration the moneys involved in duplicating programs of teaching crews and missions and logistical features of it, like spare parts, is this not a duplicating problem, a duplicating program which should be dispensed with? Should there not be a choice as between one and the other?

Dr. YORK. Sir, my directive contains the words "unnecessary duplication" rather than just eliminate duplication.

At the time that these two programs were started, it was decided by the people then responsible that both programs should proceed largely as a matter of insurance, because we were at that time taking a very large step from the Redstone, which has a range of a couple of hundred miles, on up into these 1,500-mile and 5,500-mile missiles.

There were differences between them. There were differences in the approach of the people, the engineers involved. There were differences in detail. They do have essentially the same performance characteristics, and they do have essentially—it has turned out that they have the same reliability.

In hindsight, it is correct that we could have gotten along with only one, but having come this far down the road, and having the development programs essentially finished, and these have moved into production, both procurement setups are available, and there is no particular saving at this point in making that decision. Had we, 4 years ago,

known what we know today, we would have saved a great deal of money by having picked just one.

Mr. DADDARIO. You mean, then, Doctor, that even despite the feature of safety in going through with both programs, when we have finally reached this stage, it is no more costly to have such a duplicating program and it is not costing this country more to have this duplication feature of logistics alone? That is always expensive. It is always more expensive to have two rather than one.

Dr. YORK. I would like to ask Mr. Holaday to answer that question, if I might, sir, because he has been involved in this problem much longer than I have.

Mr. DADDARIO. That will be fine with me.

Mr. HOLADAY. In proceeding with both of these missile systems, you will recall that the Secretary's information, as given to us last year, was that we had to proceed with both of them because of the urgency of deploying them at the earliest possible date. At that time we did not have proof that either missile system was going to be satisfactory. Since that date, during this past year, both of these missile systems have proven out, but we have to have 18 to 24 months' leadtime on a system of this type, and that is the reason we put them into production last year. We put both of them into production, and in doing this, we have been able to meet our deployment date.

Now, it is true, as Dr. York pointed out, having the information we have today, we should have started only one, 4 years ago. But we didn't have that confidence or know-how or ability to judge that one system would work, so we put both of them into production, and it is true the logistics will be higher, but we have gained time on the dates of deployment of these missiles.

Mr. DADDARIO. Well, I go along with that, Mr. Holaday, and it all makes sense that at the time we were uncertain and I am sure therefore we should have continued. I will go along as far as the point that it has helped us reach a schedule. But where is the point that we do become economical when we have met the schedule, once the danger is behind us, once the job has been done? Why can't we somewhere along the line say, "Now we cut out the one because the danger is behind us"?

Mr. HOLADAY. Well, we have met our objective, sir, both of them have been discontinued in production.

Dr. YORK. Both of them.

Mr. DADDARIO. I am sorry, I didn't get that.

Mr. HOLADAY. We have met our objective. Both of them have been discontinued. We have ordered our last one of both the Thor and Jupiter into production.

Mr. DADDARIO. That is all I have, Mr. Chairman.

The CHAIRMAN. Mr. King.

Mr. KING. I have a question or two which I shall address to whomever of the three distinguished witnesses cares to handle it.

Over the past 3 weeks or so we have had the privilege of hearing many, perhaps most, of the top men in this field. We find certain themes constantly recurring, certain areas of weakness, as I interpret it. One of them is this matter of correlating and collating and gathering and analyzing the technical information that comes from Russia and translating it, first of all.



We have been told on more than one occasion, for example, that the United States has done a very poor job of translating the Russian material, technical material that comes to us, in sharp contrast with the superb job that the Russians apparently are doing of translating our technical material that comes to them.

I remember that Dr. Mumford, over at the Library of Congress pointed out that we had the largest Slavic library, outside of Soviet Russia, in the world, so apparently we have lots of material. But it seems almost outrageous or at least grossly negligent that we should have allowed all of that technical information to come and not to have put it to maximum use.

So my question is:

Do you feel that comment is justified, and then do you think that steps are now being taken to adequately translate and to use this information that comes in to us?

Dr. YORK. Well, there is a disparity, there is a difference between their treatment of our information and our treatment of their information. Quite a bit is being done to translate and correlate a great deal of effort. Our organization is ASTIA, the Armed Services Technical Information Agency, which is following the work in this respect. Nevertheless, the Russians have one leg up on us, no matter what we do; that is, virtually all Russian scientists read English well. Until American scientists read Russian well, all of the technical aids will not make us equal with respect to this particular problem.

Mr. KING. I understand.

That would seem to suggest a greater emphasis on languages, particularly Russian, at the graduate school and high school level?

Dr. YORK. Much greater emphasis on languages, yes.

Mr. KING. May I ask another question now?

Reference has already been made today to the matter of leadtime.

As I understand it, Stanford University conducted a research project on this. I have not read this. I am relying on hearsay. But I understand that the results of that research demonstrated that the leadtime in Russia was considerably less than our leadtime, and further subdividing that leadtime into the time it takes to make decisions, the time for R. & D., and then the time for actual production, I believe this research pointed out that in production we are actually faster than the Russians; in R. & D. we are about the same, but where we lose so much ground is in the matter of decision, and because of that, the total leadtime for us is considerably more, and that in turn suggests perhaps a lot of administrative redtape is very disastrous.

Would you like to comment on that?

Dr. YORK. Well, in the first place, our Thor and Jupiter programs were done in a shorter time—there are some figures that have been brought up in connection with these things, as to how long it takes us and how long it takes them.

In general, the figures that are quoted indicate that it takes the Russians less time than it takes us to go from initiation to final device. However, I believe that the Thor and the Jupiter actually are cases where it took us less time than our critics say it takes the Russians, and in the Atlas and Titan, the time will be about the same as what they are usually credited with.

There are a certain number of delays, and so forth. I am not as familiar with this subject as I should be. I am aware of the report you are speaking of. It is one of a number of things in a stack which says for the new Director to read, and I will get around to it, I hope, soon.

I think that if we look into it further, some of the reasons that it takes longer to make a decision is because the requirements on the decision or what the decision should contain have to be better. We are required, for example, to hold competitive bids and to review these and to review them carefully to see who should get the job. This is part of the decision-making process in this country, which is not required at all in the Soviet Union.

So a great many of the delays in decision, I am sure, without being a true student of it, have to do simply with the difference in systems, both political and economic, and the requirements that these differences place on what the decision contains and what is to be considered in making the decision, rather than on the question of how many people are involved in making the decision and how hard they are working at it.

Mr. FULTON. And after the Department of Defense gets the money through the apportionment hearings of the Bureau of the Budget, they don't know what projects it will be spent on; is that right?

Did the witness say "Yes" or "No" or anything?

The CHAIRMAN. I didn't hear the witness say anything.

Dr. YORK. I am speechless.

The CHAIRMAN. Mr. King.

Mr. KING. Just one other short one.

Would you agree with the statement, that we have heard many times before, that one of our basic weaknesses is in the area of basic research as opposed to supporting research? It is basic research that is needed to develop a scientific program, and of course with that, the idea of greater emphasis on scientific education, tough courses down in the grammar school, and high school levels of our education?

Dr. YORK. Sir, I believe the consensus is we are at the present time ahead of the Russians in basic research, but they are coming up fast. It is evident that we could do more basic research than we have done, and it is also evident to me and most of my colleagues that we should and we do intend to augment the level of basic research in the DOD.

Mr. KING. Thank you.

The CHAIRMAN. I would like to ask you a question or two.

In reference to the matter touched upon by Mr. King, that is, in translating from Russian to English; I know it probably doesn't come within the jurisdiction of the Defense Department, but don't you think if we had some definite program to make translations of key articles from Russian to English, that it would be of great benefit to all of our scientists?

Dr. YORK. We are supporting translating programs, sir. We are not the only Government agency that is involved, but we are supporting them, and I believe that we took the lead in initiating them.

The CHAIRMAN. How much money are you putting into it?

Dr. YORK. I really don't know. I could try to find out, but I really don't know.

The CHAIRMAN. Now, are you making available to the scientific projects, such as your team down at Redstone or at San Antonio or the Pacific coast, making available the translated Russian?

Dr. YORK. Yes, and of course they have other sources, too. There are translations made by groups outside the Department of Defense. There are even, in some cases, translations made by private agencies, and translated journals are available on the market.

The CHAIRMAN. I don't think there should be duplication. That is one field where you can check duplication.

Dr. YORK. Yes.

The CHAIRMAN. You can eliminate the duplication and perhaps bring about translation of more articles.

I recently talked with a scientist who is with a great university in this country, and he had been to Russia, spent several months there, and gone to the republics away from Moscow, and Leningrad, and he was impressed with the freedom with which they would talk to him about what they are doing over there.

Now, if that freedom finds its expression in articles that they publish, and I am sure a great many of them are published, we should certainly take advantage of that possibility.

Do you know whether that is being pursued as vigorously as you think it should be?

Dr. YORK. I really don't know that it is being pursued vigorously enough. But it is being pursued.

The CHAIRMAN. Well, there is no reason why we shouldn't read the articles if they are there, and we shouldn't be ashamed of that.

Dr. YORK. No, sir, I don't think we should be. There are some cases where it is hard to get the rarer and more obscure journals. The principal Soviet journals, though, are easily available in this country.

The CHAIRMAN. I am wondering this: We have nobody on our committee staff who reads Russian, but—I am mistaken. We do have one man reading Russian, but I doubt that he could read as freely in Russian as he can in English, and if the staff has available those translated articles, it might be of assistance to us here, too. I want to ask you this:

In your statement, Doctor, you referred to 180 R. & D. facility-type items totaling close to \$200 million.

Now, they would come within the jurisdiction of this committee, and so to get an idea of the jurisdiction of the committee, could you give us a list for insertion in the record of those projects?

If they are classified, of course, don't put them in the record, but you can refer to them as classified and work it out in such a way that you would be fully protected.

Likewise, a breakdown on the expenditures. You have set forth on page 5 of your statement, and you show, for instance, for the fiscal year 1959, which is the current year, \$3.4 billion obligational authority. If you could break that down in some way, so that our staff could analyze just where the money is going, it would help us in the jurisdictional matter.

Dr. YORK. If it is of any help, the table immediately below that does break down the fiscal 1960 amounts into eight categories.

The CHAIRMAN. Could you break them down for 1959, also?

Dr. YORK. Oh, yes, sir.

(The requested information is as follows:)

**LIST OF RESEARCH AND ENGINEERING SUPPORTING FACILITIES CONTAINED IN THE PROPOSED FISCAL YEAR 1960 MILITARY CONSTRUCTION AUTHORIZATION PROGRAM ON WHICH RECOMMENDATIONS WERE MADE BY THE OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING**

**DEPARTMENT OF THE ARMY**

- Redstone Arsenal, Ala. :**  
 Extend and strengthen runway.  
 Airfield lighting.  
 Modify line 6 for rocket motor casting.  
 Conversion of building 112 to hospital.  
 Bachelor officers quarters.  
 Expansion of utilities, electrical, steam, roads.
- Fort Detrick, Md. :**  
 Four animal breeding buildings.
- Dugway Proving Ground, Utah :**  
 Communications building.  
 Photo-optometric instrumentation laboratory.  
 Water storage tank.
- Fort Huachuca, Ariz. :**  
 Trainfire I range.  
 Hardstand, aircraft (Libby AAF).  
 Ground telemetry station.  
 Ten test communications buildings.  
 Radar test building.  
 Electronics instrumentation building.  
 Avionics laboratory and instrumentation building.  
 Countermeasure instrumentation center.  
 Drone test facility.
- Fort Belvoir, Va. :**  
 Extension of runway (DAAF).  
 Modification to building 318.  
 Modification to center section, building 327.
- Surface-to-air missile tactical facilities (inside the United States) :** Missile master and electronic facilities.
- Surface-to-air missile tactical facilities (inside and outside the United States) :** Various research and development technical and support facilities (classified).

**DEPARTMENT OF THE NAVY**

- David Taylor Model Basin, Md. :**  
 Expansion of acoustic analysis center
- Naval Air Station, N.J. :**  
 Electric substation and distribution improvements
- Naval Air Station, Md. :**  
 Seaplane fueling stations  
 Arresting gear test facility
- Naval Air Material Center, Pa. :**  
 Catapult and arrest component research facilities
- Pacific Missile Range, Calif. :**  
 Point Mugu :  
 Aircraft parking apron  
 Fuel storage facilities  
 Meteorology building  
 Automotive maintenance facility  
 Frequency control facility  
 Mobile instrumentation stations  
 Instrumentation facilities (Pt. Pillar)  
 Photographic installation and calibration facility  
 Missile project building  
 Armaments test project building  
 Addition to instrumentation building  
 Warehouse  
 Addition to dispensary  
 Pacific missile range headquarters building

## DEPARTMENT OF THE NAVY—continued

## Pacific Missile Range, Calif.—Continued

## Point Mugu—Continued

Addition to security building  
 Barracks  
 Addition to mess hall  
 Addition to bachelor officers' quarters  
 Structural fire station  
 Chapel  
 Expansion of roads and utilities  
 Standby gas plant  
 Expansion of water system

## Point Arguello :

Public works shops  
 Radio receiver facility (2d increment)  
 Central launch control facility  
 Missile assembly building  
 Operational computer center real time  
 Ordnance assembly building  
 Launch site support building  
 Range users engineering building  
 High explosive magazines  
 Multipurpose marine detachment building  
 Fire station  
 Roads and utilities  
 Launch site security facilities

## San Nicolas Island :

Expansion of telephone exchange  
 Photographic building  
 Electronic maintenance shop

## Pacific Ocean MILS Facilities :

Additions to communications buildings (Eniwetok Island)  
 Additions to communication buildings (MCAS Kaneohe Bay, Oahu Island)  
 Addition to communication building (Wake Island)  
 Missile impact location building (Eniwetok Island)  
 Missile impact location building (MCAS Kaneohe Bay, Oahu Island)  
 Missile impact location building (Midway Island)  
 Sounding rocket facility (Eniwetok Island)  
 Bachelor civilian quarters (Wake Island)

## Naval Air Turbine Test Station, N.J. :

Acquisition of land

## Naval Propellant plant, Md. :

Explosive ordnance technical facilities

## Polaris facilities, various locations :

Classified facilities

## Naval Medical Research Laboratory, Conn. :

Medical research laboratory (2d increment)

## Naval Radio Research Station, W.Va. :

Maintenance shops  
 Dispensary  
 Administration building  
 Family housing—Capehart  
 Barracks  
 Marine barracks  
 Mess hall  
 Bachelor officers' quarters w/mess  
 Fire station  
 Navy-Exchange commissary  
 Warehouse  
 Recreational building  
 Utilities and site improvement

## Naval Research Laboratory, D.C. :

High level radiation laboratory

## DEPARTMENT OF THE AIR FORCE

Antigua Test Site :  
 Guided missile data collection and radar station

Arnold Engineering Development Center, Tenn. :  
 Gas dynamics test facility (addition)  
 Propulsion wind tunnel duct (modification)  
 Propulsion engine test cell (modification)  
 Propulsion engine test stand (modification)  
 Switching station (modification)

Cape Canaveral, Fla. :  
 Guided missile data collection radar station

Edwards Air Force Base, Calif. :  
 Electronics laboratory, calibration  
 Guided missile test shop components  
 Outpatient facility (addition)

Eglin Air Force Base, Fla. :  
 Guided missile shelter  
 Test stand, jet  
 Guided missile data collection theodolite station

Holloman Air Force Base, N. Mex. :  
 Equipment laboratory parachute test (addition)  
 Guided missile laboratory instrumentation  
 Water distribution mains

L. G. Hanscom Field, Mass. :  
 Library, research and professional  
 Electronic laboratory, solid physics  
 Science laboratory, data collection  
 Administration office

Patrick Air Force Base, Fla. :  
 Electronic test shop systems (addition)

Sacramento Peak, N. Mex. :  
 Science laboratory, solar observatory  
 Emergency electric powerplant  
 Road

Wideawake Field, Ascension Island :  
 Guided missile data collection equipment station

Wright-Patterson Air Force Base, Ohio :  
 Aircraft laboratory fatigue test facility  
 Propulsion laboratory, components test (HEF)  
 Science laboratory, medical (nuclear environmental)  
 Spec laboratory analysis  
 Spec laboratory analysis

*Department of Defense summary of research, development, test, and evaluation*

[Millions of dollars]

	Fiscal year 1959	Fiscal year 1960
Military sciences.....	307.6	364.1
Aircraft and related equipment.....	450.5	497.3
Missiles and related equipment.....	1,252.8	1,410.8
Military astronautics and related equipment.....	340.4	309.1
Ships and small craft and related equipment.....	155.2	161.6
Ordnance, combat vehicles, and related equipment.....	195.7	229.0
Other equipment.....	551.6	441.0
Programwide management and support.....	210.2	209.3
Total.....	3,464.0	13,622.2

<sup>1</sup> Does not include \$150 million emergency fund.

The CHAIRMAN. That will help us a great deal, and the staff would probably go over your statement and ask you for a further breakdown of some of these items.

Then you referred to, I think, just a few facilities here in your statement that are engaged in special type work. I don't have that before me here, but if there are other facilities you refer to, we would like to have a list of those, too.

Dr. YORK. I am not sure I understood the question.

The CHAIRMAN. I want the facilities you refer to.

Dr. YORK. The \$200 million worth. That is page 4, which is 180 items, totaling close to \$200 million.

The CHAIRMAN. Well, we simply want it broken down so that our staff can analyze it and see just what is going on, so that we can help keep up with the work that you are doing.

Dr. YORK. Yes.

The CHAIRMAN. That is not in a critical vein but to establish the jurisdiction of the committee and to facilitate the program legislatively.

I want to ask about the Vandenberg base on the Pacific coast.

I think you testified, at least someone did, in the Senate hearings about the progress made toward activating a squadron at the Vandenberg Air Force Base.

Do you have any information on that?

Mr. HOLADAY. What is your particular question?

The CHAIRMAN. I want to know what is being done, if anything, to further speed up the activation of that squadron at the Vandenberg base.

Mr. HOLADAY. A deployed squadron?

The CHAIRMAN. Yes.

Mr. HOLADAY. Sir, we are constructing facilities at Vandenberg Air Force Base for the deployment of one of the ICBM missiles. It is also—

The CHAIRMAN. Is that what is delaying it, the construction?

Mr. HOLADAY. Yes, sir.

The CHAIRMAN. So you can't deploy it until the construction is completed. Are you pushing that construction vigorously?

Mr. HOLADAY. Yes, sir; we are meeting the request of the Air Force. There is no shortage of money in that deployment plan there.

You also understand that we make experiments in the method of deployment at Vandenberg base. It is also a training facility. So they are not simply straightforward types of deployment. We may have several methods of deployment being used at Vandenberg because of tying them in with the training.

The CHAIRMAN. Is that the reason it is being delayed?

Mr. HOLADAY. It is not being delayed, sir.

The CHAIRMAN. Perhaps I worded my question wrongly. The Senate hearings indicated that by July 1 you would have some deployed, but, as I recall, it would probably be a year before you had a full squadron deployed.

Mr. HOLADAY. I would not like in this particular meeting to say what exactly we have deployed or the exact dates. I would be glad to cover that tomorrow in an executive meeting.

The CHAIRMAN. I will ask you about it tomorrow, then.

I want to ask you another question, and then I will be through.

Is this million-and-a-half-pound-thrust rocket the type of missile that would be used in a lunar probe?

Dr. YORK. I would like to refer that to Mr. Johnson.

Mr. JOHNSON. I am sorry. Would you repeat the question?

The CHAIRMAN. The million-and-a-half-pound-thrust missile that you are working on, by clustering the engines together, is that the type of missile that might be used in a lunar probe?

Mr. JOHNSON. Yes, sir; it is one. There are a number of vehicles that could be used. This is certainly one; yes.

The CHAIRMAN. Would it be susceptible to use in the Sentinel program?

Mr. JOHNSON. The Sentry?

The CHAIRMAN. Is it Sentinel or Sentry?

Mr. JOHNSON. Sentry.

Yes; certainly it will be used in all military and some civilian programs.

The CHAIRMAN. Is there any justification for speeding up the million-pound-thrust missile?

Mr. JOHNSON. I think that is going as fast as it can go. This is a long, hard job to develop a practical thrust of that size.

The CHAIRMAN. Do you have any information on the Russian missile, indicating the thrust and the technical way in which it was built?

Mr. JOHNSON. We can guess that the thrust that the Russian missile has developed is something around 500,000 pounds of thrust.

The CHAIRMAN. And we are developing a million and a half pounds, so it would be three times the power of the Russians?

Mr. JOHNSON. I am sorry, sir. This gets kind of technical, because you have to take into consideration upper stages, and I am talking about the basic thrust, the basic booster.

Now, we do know or we do think that the Russians have clustered engines, as we are planning to do, and do have upper stages as well, so I am talking about the basic booster. Our guess is that we may be passing them or equaling them at least, and probably passing them when we have our million-and-a-half-pound thrust ready.

The CHAIRMAN. You think the Russians are using clustered missiles?

Mr. JOHNSON. We have reason to guess this; yes. They may be clustering IRBM's. Anything more on this would be classified, I am afraid.

The CHAIRMAN. I will not pursue the question any further at this time.

Mr. Wolf, you had another question?

Mr. WOLF. Yes.

May I say that I am grateful that you came down today. If I seem to be critical, it is based on the very natural reaction every citizen in America has to what he reads in newspapers which discourages him as to where we stand.

Now, my next question is academic, as to a balanced budget and things of that kind.

One thing that depressed me at Cape Canaveral and at Huntsville was the fact that the minute the missile takes off, no matter what kind it is, it is gone. As we get into the Saturn program, this cluster program, where we have a battleship in effect taking off, I am wondering if there is any honest-to-goodness research being done to salvage these first and second stages so it won't be a complete waste the minute it is launched.



Mr. JOHNSON. Very definitely. This is something we have asked ABMA to develop, to recover the booster and the engines, and I think there is every reason to believe that this is feasible.

Mr. WOLF. Would you care to enlarge on what method of procurement or reprourement could be used?

Mr. JOHNSON. No—well, we are getting classified now.

Mr. WOLF. Well, we will ask you that tomorrow then.

Mr. FULTON. I have a question, if I may, sir.

The CHAIRMAN. Mr. Fulton.

Mr. KARTH. I asked the gentleman to yield for a moment.

The CHAIRMAN. I promised to recognize Mr. Fulton next.

Mr. FULTON. I will be glad to yield.

The CHAIRMAN. Then we will recognize you, Mr. Karth.

Mr. KARTH. Mr. Chairman, just one question I had.

All the way through these written presentations I have noticed that they have laid a great deal of emphasis on the assignment of programs, and it seemed to me as I read along with the gentleman that "Mrs. V," which is under ARPA, and Dyna-Soar, which is under DOD, seemed to be similar. Is that correct?

Mr. JOHNSON. Yes.

First you must get a man in orbit to see if he can function, if he is useful in space. This is the object of the Mercury program.

Following this, in the military, we want to put a man who can maneuver in space. Dyna-Soar or "Mrs. V," which are really the same programs, would use the information obtained in Mercury, and then would go from there to develop a winged airplane which could orbit at the will of the pilot and land at a preselected base.

Mr. KARTH. Fine.

Thank you, sir. That is all.

The CHAIRMAN. Mr. Riehlman.

Mr. RIEHLMAN. Dr. York, I will submit a list of questions to you to be inserted along with the answers in the record.

(The questions and answers are as follows:)

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,  
*Washington, D.C., March 9, 1959.*

HON. R. WALTER RIEHLMAN,  
*House of Representatives.*

DEAR MR. RIEHLMAN: In response to your request of February 19, 1959, I am pleased to furnish the attached answers to the questions which you desire to be made a part of the hearings currently being conducted by the House Committee on Science and Astronautics. I believe the format used will lend itself to ready incorporation in the record of the hearings.

Sincerely yours,

HERBERT F. YORK.

Mr. RIEHLMAN. Does the authority of your Office extend to individual projects under the control of General Medaris in the Army, Admiral Raborn in the Navy, and General Schriever in the Air Force?

Dr. YORK. Yes, I have supervision over all research and engineering activities in the Department of Defense including the missile programs. However, this does not mean that I am concerned with the detail of the day-to-day administration of these programs; but I will, of course, become directly involved on major issues and any items involving controversy.

Mr. RIEHLMAN. Do you have authority to change or assign priorities among missile projects in the three services and ARPA?

Dr. YORK. Yes, with the exception of those missile projects which have been assigned a national priority by the President.

Mr. RIEHLMAN. Can you modify, cancel, suspend, or accelerate specific research and development projects in all agencies of the Department of Defense?

Dr. YORK. Yes, I can and will do so whenever such action is clearly indicated.

Mr. RIEHLMAN. Does your authority extend to contracting arrangements entered into by agencies and offices within the Department of Defense for the performance of technical support, systems engineering, feasibility studies, and other services connected with research and development functions? Specifically, such functions as those performed by Space Technology Laboratories and the Institute for Defense Analyses?

Dr. YORK. Yes, my authority covers all phases of the research and engineering activity in the Department of Defense. However, I would not become involved in the details of contract administration unless a specific problem arose which required such intervention. The detailed supervision of the specific contractors which you mention would be the responsibility of the Air Force for the work of the Space Technology Laboratories, the Director of WSEG and the Director of ARPA for the Institute for Defense Analyses.

Mr. RIEHLMAN. Does your Office have complete access to all records and technical data within the control of research and development contractors, including STL and IDA?

Dr. YORK. Yes, my Office will have complete access to any information which is derived in the performance of contracted work.

Mr. RIEHLMAN. What control does your Office exercise over funding for proposed and approved research and development projects in the Army, Navy, Air Force and ARPA?

Dr. YORK. I have the authority to approve, disapprove, or modify all proposed or existing DOD research and development programs and projects including the funding for such projects.

Mr. RIEHLMAN. How do the functions of WSEG relate to the functions of your Office?

Dr. YORK. I work very closely with the Joint Chiefs of Staff in making assignments to WSEG and assuring that such assignments are completed as expeditiously as possible. Every effort is made by my office to insure that the results of WSEG studies are incorporated into the research and engineering plans and programs of the military departments as soon as possible after evaluations have been completed and accepted.

Mr. RIEHLMAN. What are the relationships between WSEG and IDA? Between WSEG and ARPA?

Dr. YORK. The IDA contract was initially designed to provide needed technical competence which WSEG could not recruit or retain under normal administrative procedures. Assignments varied in nature and required such diverse talents that it became impracticable and uneconomical to depend upon a permanent staff for conducting the required studies. In fact, the natural tendency was to tailor the studies to the staff available rather than to determine the actual requirements and then obtain the personnel best qualified to conduct the evaluations.

This contractual arrangement worked so well for WSEG that a similar procedure was established with IDA when ARPA was organized. IDA established an Advanced Research Projects Division under the contract for the purpose of furnishing technical assistance to ARPA when needed. Other than this mutual contractual arrangement there is no direct relationship between ARPA and WSEG.

Mr. RIEHLMAN. Are the records and technical data under the control of IDA, ARPA and your Office, the Directorate of Defense Research and Engineering, completely available to WSEG?

Dr. YORK. Yes, WSEG has access to any information which is needed to complete their assignments.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. The moon is not outside of your strategic area of operations?

Dr. YORK. I wanted to correct the record here.

Dyna-Soar and "Mrs. V" are not the same program. Dynasoar is the name of an Air Force program which is best described as being the followup of the X-15 program, which is a hypersonic airplane. Dynasoar is not a space program.

Some of the people who participated in it, for one reason or another, like to boast that it is, but it is not. It is a proposal to develop hyperhypersonic airplanes, if you like, leading, perhaps eventually to a glide bomber.

The information gained from the Dyna-Soar program or the first phases of the Dyna-Soar program will be information which is necessary and essential in order to go on further with a recoverable maneuverable or I should say a maneuverable recoverable space vehicle, "Mrs. V", which Mr. Johnson was referring to.

They are supplementary programs. "Mrs. V" is in the study phase at the present time, I might comment and not in the active development phase in any event.

The CHAIRMAN. Are you going to use these space men in the Dyna-Soar program?

Dr. YORK. No, not in the parts of the Dyna-Soar program that are in sight, because it doesn't go into space. It may go up and come back after brief penetration—

The CHAIRMAN. It skips and hops into space?

Dr. YORK. Yes, like the X-15 does.

The CHAIRMAN. Mr. Fulton.

Mr. FULTON. I am glad to have the explanation, although I do not feel that the record was actually contradictory. I think it was just a question of the changing use of terms. Obviously, there is no such thing up there as we term air in the atmosphere where the Dyna-soar will be operating, so that on some terminations you could call it space, atmosphere, but not air.

Dr. YORK. That is a reasonable way of looking at it.

Mr. FULTON. The question comes up. If the moon is within our strategic area as to a manned satellite, why wouldn't it be possible to put up an unmanned tank and direct it by radio from the earth or from a station?

Dr. YORK. From the standpoint of technical feasibility it would be possible to do that.

Mr. FULTON. Why wouldn't that be the next stage after a hard landing of some sort of instrument on the moon?

Dr. YORK. That very well may be.

Mr. FULTON. Yes, but what I am really asking you: Are you planning that it will be?

Dr. YORK. That is the NASA's responsibility, as presently understood by us, as to the exploration of the moon.

Mr. FULTON. So you would not then be in on the landing of an automatic tank of any kind on the moon, even though we did not have it manned?

Dr. YORK. Our understanding of the program is that that is in the NASA's responsibility.

Mr. FULTON. You see, I may be trying to get you some jurisdiction there.

Well, may I finish with this.

I do think you are all doing a good job, and I want to compliment Roy Johnson as well as Dr. York and Mr. Holaday for the excellent work they have done in this field, which is very difficult—where we cannot explain to the public fully just what is being done. May I ask this question:

You believe that this country is secure and that we have an adequate program of balanced forces of various kinds, including your area, where you can assure the public that we are not delaying, but moving ahead with all reasonable speed? Is that right?

I would like each of you to answer that.

Mr. HOLADAY. The answer to your question, in my own opinion, is "Yes." We would like to move ahead faster technically, but this is not a question of money to do it. It takes time. It takes education. It takes cooperative work to move ahead in these areas.

Overall, I believe that the country has a well-balanced program, using to the best of its ability its technical knowledge and applying this to weapons systems.

Mr. FULTON. Dr. York?

Dr. YORK. I also believe the program is reasonably well balanced; yes, sir.

Mr. FULTON. And that it is moving ahead now?

Dr. YORK. It is moving ahead adequately.

Mr. FULTON. For the security of the country?

Dr. YORK. In any field of interest, yes.

Mr. FULTON. Mr. Johnson?

Mr. JOHNSON. I could answer your question this way, I think:

I will admit when I came to Washington a year ago, I had doubts. I don't today. I am sleeping very comfortably.

Mr. FULTON. Thank you very much.

The CHAIRMAN. Let me say this:

That question is a Mother Hubbard question. It covers everything.

How can you feel like the program is moving ahead satisfactorily when it is going to take 3 or 4 years to overcome the Russians?

I am asking all three of you that, because there is a great responsibility falling on all of us, when we know the Russians are ahead. It is unusual that the Russians are ahead of us in military equipment. That is really what it is.

Mr. JOHNSON. As I said earlier, they are ahead in space technology, but I don't believe this is any reason why I should not sleep comfortably. I do not think in the period we are talking about that space technology is going to be used militarily against us to the point that the country is in jeopardy.

The CHAIRMAN. What period do you think that will be in, beyond the next 3 or 4 years?

Mr. JOHNSON. I think we will have caught up with the Russians in that period of time, and then the time of danger comes out of there.

The CHAIRMAN. You mean we are safe for 3 or 4 years, and the time of our danger comes after that?

Mr. JOHNSON. Yes, and then we will have caught up with them. I think the question here was on balance, total effort, as to whether we felt we were doing a good job, and whether we were secure, and the answer to the question was on balance.

The CHAIRMAN. Let me say this in conclusion:

We have kept you gentlemen here a long time. You will be available tomorrow for executive session, will you not?

Dr. YORK. At the same time?

The CHAIRMAN. Yes, at the same time, 10 o'clock.

I want to say on behalf of the committee that we do appreciate your coming here, and I think you have answered the questions candidly and frankly and have been of great help to the committee.

This is the first time that we have had the opportunity of having you three distinguished gentlemen appear before us, and we appreciate that very much.

If there is no further business, then the committee will adjourn until tomorrow morning at 10 o'clock.

(Whereupon, at 12:55 p.m., the committee recessed, to reconvene at 10 a.m., Wednesday, February 18, 1959.)